

MASTER
ECONOMICS OF BUSINESS AND STRATEGY

Are Portuguese Consumers Willing to Go “Green”?

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M

2022



FACULDADE DE ECONOMIA



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Dissertation
Master in Economics of Business and Strategy

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2022

Acknowledgments

I am happy I have completed yet another stage of my academic life. It was a challenging journey, but I am very proud of everything I have accomplished and thankful for having the right people supporting and cheering me all the way through. Now, I am looking forward to seeing what the future will bring me.

I would like to especially thank my supervisors, Professor Nuno Sousa Pereira and Professor Tiago Ribeiro, for their devoted time and attention. Their guidance throughout these past few months was crucial for me to be able to deliver this final work. Working alongside them has given me great inspiration for the future and taught me to be ambitious, even when things may seem hard to accomplish.

Likewise, I would also like to thank my family and friends for their unconditional love and support. They have helped shape the person that I am today, and I am deeply thankful for having each and any one of them in my life.

Lastly, I want to dedicate the present work to my mum and dad, who are my greatest joy in life. I would like to express my gratitude to them for their patience, all the encouragement, and for always being there for me. I hope I have made them proud.

Abstract

Up until now, the second decade of the 21st century has been marked by a massive green movement, with consumers exhibiting greater environmental concern and, side by side with the Governments, exacerbating pressure on companies to incorporate sustainability guidelines into their business strategies. Slowly making its way up the strategy ladder, sustainability is becoming one of the top priorities in companies' day-to-day operations. Companies must continue striving to become more sustainable since, in the modern business landscape, being environmentally sustainable serves more than a “common practice” and can act as a differentiation factor, thus, leading to economic success. Specifically, in retail, efforts to implement sustainable initiatives such as the use of renewable energy have been complemented by an increasing number of green alternatives available to consumers, as a response to the growing demand for such products. The purpose of the present dissertation is to, for the particular case of the Portuguese grocery retail market, understand if consumers are increasingly inclined to purchase eco-friendly products and measure their willingness to pay for sustainable features. Data collected from 500 individuals through a structured survey, which comprised questions from an environmental concern measurement scale and a discrete choice experiment, allowed to understand how Portuguese consumers feel, and think about the environment and the purchase of green products. It was estimated that they would be willing to pay 4,8 euros more for the same product (in this case, a dish detergent) to be environmentally sustainable. All in all, the study's findings suggest that Portuguese consumers are concerned with the environment, value positively the “green” attribute, and are willing to become “greener” (in terms of their willingness to pay for an eco-friendly product). Possible implications of these results for firms looking to drive green purchasing behavior are also discussed.

JEL codes: Q01, Q56

Keywords: sustainability, green, eco-friendly, attitude-intention-behavior gap, environmental attitudes, willingness-to-pay (WTP), discrete choice experiment (DCE)

Resumo

Até ao momento presente, a segunda década do século 21 tem sido marcada por um massivo movimento verde, com consumidores a demonstrarem uma grande preocupação ambiental e, conjuntamente com as entidades governamentais, a exercerem pressão sobre as empresas para incorporarem diretrizes de sustentabilidade nas suas estratégias de negócio. Lentamente subindo a pirâmide das metas estratégicas das empresas, a sustentabilidade está-se a tornar num pilar prioritário nas operações do dia-a-dia das empresas. As empresas devem continuar a esforçar-se para se tornarem mais sustentáveis dado que, no cenário empresarial moderno, ser ambientalmente sustentável constitui mais do que uma “prática comum” e, de facto, pode atuar como um fator de diferenciação, levando assim ao sucesso económico. Especificamente, no setor do retalho, esforços para implementar iniciativas sustentáveis como o uso de energia renovável têm sido complementadas por um número cada vez maior de alternativas verdes disponíveis para os consumidores, como resposta à crescente procura por estes produtos. O objetivo da presente dissertação é, para o caso particular do mercado do retalho alimentar português, perceber se os consumidores estão cada vez mais motivados a comprar productos ecológicos e medir a sua disponibilidade a pagar pelo atributo verde. Dados recolhidos de 500 indivíduos a partir de um questionário estruturado, composto por questões provenientes de uma escala de medição da preocupação ambiental e uma experiência de escolha discreta, permitiram perceber o que os consumidores Portugueses sentem e pensam sobre o meio-ambiente e a compra de produtos verdes. Foi estimado que estariam dispostos a pagar 4.8 euros a mais para um mesmo producto ser ambientalmente sustentável. Em suma, os resultados do estudo sugerem que os consumidores Portugueses estão preocupados com o meio-ambiente, valorizam positivamente o atributo verde, e estão dispostos a tornarem-se mais “verdes” (em termos da sua disponibilidade para pagar por um producto ecológico). Possíveis implicações destes resultados para empresas que procuram impulsionar o comportamento de compra verde também são discutidas.

Códigos JEL: Q01, Q56

Palavras-chave: sustentabilidade, verde, ecológicos, gap atitude-intenção-comportamento, atitudes ambientais, disponibilidade a pagar (DAP), experiência de escolha discreta (ECD)

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List of Acronyms

TPB	Theory of Planned Behavior
WTP	Willingness to Pay
NEP	New Ecological Paradigm
DCE	Discrete Choice Experiment
CBC	Choice-Based Conjoint
RS	Rate of Substitution
CVM	Contingent Valuation Method
RUT	Random Utility Theory
MNL	Multinomial Logit
MRS	Marginal Rate of Substitution

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1. Introduction

“The greatest threat to our planet is the belief that someone else will save it.” (Swan, 2016)

The growth of the global population and production has placed tremendous pressure on the world’s natural resources (Mostaghel & Chirumalla, 2021). More so, if countries around the world continue developing along this path, rather than taking a step forward and combining efforts towards more sustainable patterns of living, the overutilization and overconsumption of scarce natural resources will cause irreversible environmental consequences like the ones one is already witnessing today such as climate change and deforestation (Chen & Chai, 2010; Ketelsen et al., 2020).

The topic of sustainability is not relatively new but has been receiving a lot of attention from the media in the past decade. Efforts from the media to increase transparency and raise awareness about environmental protection have put pressure on governments to implement policies to fight several environmental causes such as climate change and forced consumers to be confronted with their own actions and rethink their behaviors. Moreover, it has helped change people’s mindsets and a common movement towards environmental concerns seems to be slowly forming.

On the demand side, a growing consumer trend towards more sustainable consumption is observable and purchasing habits, reflecting individuals’ aspirations of carrying on more sustainable lifestyles. Chladek (2019) concluded that sales of sustainable products have steadily increased by 20 percent between 2014 and 2019, reflecting consumers’ growing demand for green products. This, in turn, is pushing companies to incorporate sustainable practices within their operations and expand their product portfolio to include more eco-friendly alternatives. Likewise, as public scrutiny increases, on the supply side, companies are feeling the pressure to design more sustainable business models, hence, positioning sustainability as one of the focal and integral points as part of their value propositions (Bashir et al., 2020).

However, the emphasis should not only be placed on the effort that companies need to make as consumers also play a major role in this sustainable movement. Through a pattern of sustainable consumption, which includes, for example, the purchase of green products (also called “green purchasing”) or second-hand products, consumers can contribute to

minimizing their environmental impact (Hojnik et al., 2019). Consumers must break this cycle of consumerism that is characterizing the 21st century, where the acquisition of new goods is directly linked to personal satisfaction and consumers are purchasing way more than what they need, failing to realize the environmental impact of their actions.

Consumers' mindset has been slowly changing throughout these past few years and they are increasingly motivated to adopt more sustainable purchasing and consumption habits. In a research investigation that took place in 2019, 72 percent of respondents claimed to have bought more environmentally friendly products that year than ever before and 81 percent stated that they would continue purchasing green products (Accenture, 2019). Additionally, a study done in 2022 by IBM Institute for Business Value (IBV) found that more than half of respondents considered sustainability to be an even more important aspect today than it was a year ago (Cheung et al., 2022). These data emphasize how much more environmentally conscious consumers all over the world are today and this sheds a positive light on the future since it signifies that consumers are progressively inclined to commit to more sustainable habits of consumption.

Likewise, a study conducted by IBM in 2021 showed that 62 percent of consumers were willing to change their shopping habits to help reduce environmental impact, an increase from 57 percent in 2019. The previously mentioned data seem to highlight the fact that the Covid-19 pandemic pushed citizens to acknowledge the ecological impact of their actions and the need to change these consumption patterns. Moreover, the study showed that 84 percent of consumers considered sustainability an important factor when choosing which product to buy, stressing the need for companies to incorporate sustainability as a core principle of their day-to-day operations if they aim to remain competitive in the market (Orrell et al., 2021).

In addition, in a study carried out in 2020, over 70 percent of respondents claimed that they were willing to pay more for brands that are sustainable and/or environmentally responsible (Haller et al., 2020). A survey done in 2022 has solidified this statement with almost half of consumers globally stating they have paid a premium for green products (Cheung et al., 2022). From this, it is possible to say that consumers are committed to putting their money where their mouth is. Notwithstanding, it must also be pointed out there are still consumers who are not yet ready to trade off some product attributes such as the price for green features (Ginsberg & Bloom, 2004; Gan et al., 2008).

Furthermore, evidence shows that, although consumers exhibit greater environmental awareness and concern and portray a positive attitude toward green purchasing, many times those intentions do not translate into actual purchasing behavior (Kuchinka et al., 2018). Resorting to Ajzen's theory of planned behavior, consumer behavior is explained by a condition of several factors such as environmental knowledge, environmental concern, pro-environmental attitude, and green purchase intention (Ajzen, 1991; Kalafatis et al., 1999). Consumers' concern for the environment can influence their behavior because, as they become more sensitive to environmental issues and more conscious about their purchases, they will most likely seek out to purchase green products since these are products with lower environmental impact (Hines et al., 1987; Ishaqswini & Datta, 2011; Khare, 2015). In other words, consumers who express higher environmental concern and posit a pro-environmental attitude will tend to manifest a strong intention to purchase green products (Mostafa, 2007; Hartmann & Apaolaza-Ibañez, 2012; Iravani & Mahrooian, 2012; Junior et al., 2015). However, evidence has endorsed the idea that there is not a direct link between intention and behavior, meaning that many times consumers' green purchase intention is not ultimately reflected in actual purchase behavior. This phenomenon is called the "attitude-intention-behavior gap" and has been attracting an increasing number of scholars trying to understand which factors help explain it, pointing out the higher prices of green products, their lower perceived quality, and limited availability as the main determinants (Mostafa, 2007; Grimmer & Miles, 2016; Bashir et al., 2020; Ketelsen et al., 2020; Van Doorn et al., 2020).

Taking this into consideration, in order to better understand consumers' attitudes towards green products, one can try to assess their level of environmental concern, comprehend how different product attributes can influence their purchasing decisions, and measure their level of price sensitivity regarding sustainable features. An individual who is more concerned with the environment is, theoretically, less price sensitive regarding eco-friendly products, and will be willing to pay a higher price for them, hence, exhibiting a higher commitment toward becoming "green" (Tanner & Wölting Kast, 2003; Ishaqswini & Datta, 2011; Parsa et al., 2015; Li & Kallas, 2021). Hahnel et al. (2014) found that consumers who share pro-environmental values are willing to pay a higher premium for green products.

Although the number of sustainable products is increasing to meet growing demand, and sustainability remains an important aspect for consumers, sustainable products are still a niche market (Vermeir & Verbeke, 2006; Young et al., 2010; Van Doorn et al., 2021). It has been estimated that the global market share for sustainable or green products accounts

for just about 4 percent (Gleim et al., 2013; Ritter et al., 2015). For that reason, there is a need for companies to start exploring this market extensively by not only making more sustainable alternatives available but also incentivising consumers to purchase more green products. In order to do that, companies must study how consumers think and make decisions to understand what factors matter to them the most at the purchasing moment and, therefore, be able to design effective strategies (e.g., pricing or design strategies) to make green products more appealing, hence, stimulating their purchase. Nonetheless, when looking at existing research, the focus of analysis has been rather on studying the behavior of green consumers (i.e., consumers who are already buying eco-friendly products) (Thompson, 2015). This information is relevant for marketers because, after creating the profile of the green consumer, they can more efficiently target those consumers and, as a result, drive more purchases from them. However, it is believed that attention should be given to studying the reasons explaining why a lot of consumers are not engaging in this sustainable purchasing behavior. Instead of analysing what drives green consumers to buy eco-friendly products, gathering information on what factors are a barrier to green purchasing can bring valuable insights into understanding how to drive consumers to purchase such products. Learning about consumers' decision process and studying how consumers feel and think about sustainability will provide companies with useful information to motivate consumers to buy green products (Kuchinka et al., 2018). Considering this, the present work aims to explore these issues and, with that, support companies to influence consumers to carry on more eco-friendly purchasing behaviors.

Even though the importance of adopting sustainable patterns of consumption has been highlighted in various sectors of the economy (e.g., transportation, food, and clothing), this dissertation will study specifically the food retail sector given that consumers in this sector are more sensitive to issues related to sustainability (Mostaghel & Chirumalla, 2021). An article published in 2021 by Deloitte stated that consumers feel more motivated to make sustainable purchases when regards to product categories that are perceived as the most essential and from which they buy frequently, which includes grocery shopping for food, non-alcoholic beverages, and everyday household supplies (Deloitte, 2021). Moreover, when considering total households' environmental impact, data from the year 2015 show that expenditures on food were the main contributing factor, accounting for about 50 percent, on average (Ivanova et al., 2015). As a result, this sector has become the target of a particular emerging area of research studying the impact of sustainability on consumers' perceptions

and purchasing habits. Notwithstanding, the existing literature lacks reasonable research on exploring the price sensitiveness of grocery retail shoppers when presented with products that exhibit environmentally sustainable attributes. Furthermore, there are very few articles exploring this same issue regarding the Portuguese food retail sector, and specifically trying to understand if a possible “attitude-intention-behavior gap” can be observed amongst Portuguese consumers. Domingues and Gonçalves (2018) stressed how environmental attitudes have not been deeply analysed in Portugal. Additionally, data from the year 2010 showcasing Portugal as the Mediterranean country with the highest ecological footprint highlights how relevant it is to study this particular economy (Galli et al., 2017). The present dissertation will try to address the mentioned research gaps.

Given that the concept of sustainability is a quite broad term endorsing both environmental, economic, and social aspects (known as “triple bottom line”), it is important to specify the focus of the present work to be able to best frame it within the existing literature (Du Pisani, 2006). This dissertation will center its analysis on the environmental side of the term with a particular emphasis on the purchase of environmentally friendly (or eco-friendly) grocery products.

Specifically, the present dissertation will try to address the following four research questions.

RS1: Is there any statistical relationship between the level of environmental concern and degree of price sensitivity, i.e., do Portuguese consumers who demonstrate to be more concerned with the environment exhibit lower sensitivity to price changes?

RS2: Are Portuguese consumers’ green purchase intention (showcased by a greater level of environmental concern) reflected in their decision-making process? Do Portuguese consumers value more a product that is eco-friendly, versus a non-green alternative?

RS3: How much are Portuguese consumers willing to pay more for green products?

RS4: Are consumers who portray to be more concerned with the environment willing to pay a higher price for eco-friendly products?

The present work will shed light on Portuguese consumers’ position and opinions regarding the topic of sustainability and estimate their willingness to pay for eco-friendly products. All in all, the main goal is to calculate, for the case of the Portuguese grocery retail market, the magnitude of influence of different product attributes on consumers’ decision-

making processes when shopping for their groceries and understand if they are inclined to purchase green products, even if that means paying a higher price. The present study will contribute to the body of literature on green purchasing regarding the Portuguese food retail sector, focusing on the consumers' perspective (the demand side).

The dissertation is organised as follows. After chapter 1, Introduction, there is a section reviewing the existing literature to identify the key concepts, provide a general theoretical framework of the research questions, and expose the different contributions to the literature. In chapter 3, a presentation of the composition of the questionnaire used to collect the necessary data is made and the chosen data collection method is discussed. Additionally, an introduction to the experimental method applied is given. Chapter 4 is dedicated to displaying and discussing the results obtained from the study. Lastly, in chapter 5, as of final considerations, managerial implications of the results of the study are presented, as well as the limitations that the study presents and recommendations for further research.

2. Literature review

For the following chapter, the primary goal is to present the “current state of the art” and explain the theoretical framework of the research questions, by identifying the key concepts and exposing the different contributions to the existing literature.

2.1. The Broad Concept of Sustainability

In face of the severe environmental and social consequences of fast population growth and rapid industrialization, the need for sustainable growth can be traced back to the 1970s. In 1972, a report for the Club of Rome’s project entitled “The Limits to Growth” was published, in which the authors claimed that “if the present growth trends in world population, industrialization, pollution, food production, and resource depletion” would continue unchanged, the limits to growth would be reached a lot sooner than expected (Meadows et al., 1972, p. 23). Alongside this, the concept of “zero-growth” economies emerged due to the underlying idea of a perceived trade-off between economic growth and environmental conservation. The new concept implied that, in order to protect the environment, an economy should not grow/expand (Purvis et al., 2019). Moreover, during that same year, the first World conference about the environment stressed the importance of changing consumption and production habits to control the relentless environmental consequences that one was already witnessing at the time in the world. For the first time, the idea that countries should no longer solely focus on economic and social matters, but also on the preservation of the environment and the sustainable use of natural resources was formalized (United Nations, 1972).

In 1987, the concept of sustainable development was established and the World Commission on Environment and Development (WCED) publishes a report with the title “Our common future” (best known as the Brundtland report). The report recognized the undeniable tension between economic growth and environmental preservation and expressed the urge to establish a balance between the two. Therefore, at this time, the conception of the idea of “zero-growth” economies was rightfully considered to be too extreme, thus, giving rise to a new notion of growth, namely referring to a more sustainable and environmentally responsible level of economic growth (Purvis et al., 2019). Furthermore, it highlighted the three pillars of sustainable development- economy, society, and environment- that would later be commonly known as the “triple bottom line” (Du Pisani,

2006; Sdrolia & Zarotiadis, 2018). The Brundtland report further states that development should be carried out so that the needs of the present generation are fulfilled “without compromising the ability of future generations to meet their own needs” (WCED, 1987, p. 16).

Going back to the preliminary uses of the term “sustainability”, it was first attached to the concept of sustainable economic growth, meaning stable levels of profits (McKinsey & Company, 2009). Later on, given the environmental emergency that the world is living in today, the terminology “sustainable development” has been very much used in association with the topic of environmental preservation.

Even though research on the topic of sustainability started emerging in the 1970s, it has received greater attention over the past two decades due to consumers being more environmentally conscious about their actions and the intense pressure exerted on companies to change their operations and business guidelines to incorporate environmental concerns (Høgevold et al., 2014).

2.2. Green Behavior- The Supply Side

On the supply side, companies can protect the environment by implementing new initiatives such as the use of renewable energy to turn production and distribution systems more environmentally friendly and the development of greener alternatives (Nadella, 2016). For companies, carrying out actions to reduce the environmental impact of their daily activities (i.e., “green behavior”) can bring a lot of benefits. As a direct benefit, it contributes to an improvement in operational efficiency through a decrease in operational costs (e.g., a decrease in energy costs with the use of renewable energy and photovoltaic power plants). As an indirect benefit, the fact that there is growing consumer demand for eco-friendly products creates an opportunity for companies to broaden their business in this expanding and promising market (Matopoulos & Bourlakis, 2010; Moser, 2016). Moreover, since consumers today are more sensitive to environmental issues and conscious about their purchases, the choice of which brand to buy from also takes into consideration the companies’ environmental impact. Therefore, by engaging in sustainable practices, companies are set to be in a better position to earn customer loyalty and be perceived positively by consumers (Lavorata, 2014). Likewise, a company that is fully invested in turning into an environmentally sustainable enterprise attracts talented people and increases employee satisfaction and, consequently, employee commitment (Orrell et al., 2021). All

these factors make companies realize that they can, indeed, do well by doing good, as research shows that companies that engage in green strategies can attain higher profitability levels (Menguc & Ozanne, 2005; Ioannou & Serafeim, 2019). Accordingly, companies should recognize that being environmentally sustainable is more than merely complying with a moral or legal requirement; it can also serve as a strategic tool that guarantees a competitive advantage through, for example, innovative green products, hence, leading to economic success (Claro et al., 2013; Cantele & Zardini, 2018). More so, with respect to the food retail sector, since an increasing number of companies are incorporating green products into their range of offerings, the availability and variety of such products appear to be a potential differentiating factor, just like price (Matopoulos & Bourlakis, 2010).

Companies also play a pivotal role in educating and influencing consumers to change their purchasing and consumption habits (Jones et al., 2011; Bălan, 2020). Namely in the food retail sector, companies can cultivate demand for sustainable products and promote sustainable patterns of consumption by further developing the market for green products (i.e., eco-innovation) (Chkanikova & Lehner, 2015). Eco-innovation involves the creation of new green products, meaning products that are less harmful to the environment due to their production and distribution process and to the materials used in packaging (Junior et al., 2015; Johnstone & Tan, 2014). These include products produced in a sustainable manner with fewer resources, made of recyclable or biodegradable materials, and that require less plastic packaging (Chen & Chai, 2010).

2.3. Green Behavior- The Demand Side

2.3.1. Green Purchasing

On the demand side, consumers must also behave as active agents by embracing more sustainable lifestyles (Rokka & Uusitalo, 2008). As end-users, consumers can contribute to an economy's sustainable development through their purchasing decisions and consumption patterns (Rizkalla, 2018). Research shows that consumers are increasingly giving more thought and consideration to the environmental impact of their consumption and purchasing behaviors, which, in turn, translates into higher demand for green products (Laroche et al., 2001; Chen & Chai, 2010). Consumers are demonstrating their increased concern for the environment by adopting an eco-friendly purchasing behavior and following patterns of sustainable consumption (a concept that first emerged in 1992) (Martin & Simintiras, 1995; Cohen, 2010; Mei et al., 2012). This defines the so-called green consumer (Gleim et al., 2013).

Concerning the topic of green purchasing (i.e., the acquisition of products that have a lower environmental impact), the retail sector has been the main object of study due to the level of proximity between retailers and final consumers (Claro et al., 2013; Johnstone & Tan, 2014). Nonetheless, there is still a relatively small number of studies debating the affair of sustainable development from the consumers' standpoint regarding the retail sector.

In addition, research reveals that, particularly in the grocery retail sector, consumers are more sensitive to environmental sustainability issues and, therefore, retailers are deeply feeling the pressure to be more critical about how their products are being produced and packaged (Van Giesen & Leenheer, 2019; Mostaghel & Chirumalla, 2021). Moreover, relative to other economic sectors, the grocery retail sector has been the one where consumers and companies are demonstrating a greater commitment to environmental sustainability and where consumers tend to value green attributes more (Gadema & Oglethorpe, 2011; Business Wire, 2021). Thus, studying consumers' perceptions of sustainable consumption in this sector and how grocery retailers can guide consumers towards more eco-friendly purchasing behaviors is of great interest.

Existing literature has established that, when considering the grocery retail sector, there are mainly two groups of customers, the purpose-driven consumers, and the value-driven consumers. The former describes consumers that normally look for brands and products that are aligned with their values and beliefs, who consider sustainability an important matter and, therefore, place a higher value on green products. On the other hand, value-driven consumers give primary preference to price and effectiveness and do not regard so highly sustainability features (Haller et al., 2020). Considering this, it is of great relevance for Portuguese retailers to get a sense of how their customers think and value different product attributes (and, especially, the green attribute) to be able to design their strategies to effectively target and influence consumers to purchase eco-friendly products. On that note, one of the purposes of the present study is precisely to obtain a better understanding of that.

When looking for differences between distinct consumer groups, most studies reason that younger consumers have been the ones demonstrating a higher commitment to becoming "green" (Anvar & Venter, 2014). In fact, many research scholars argue that Generation Y is the generation that plays a more active role and is more vocal about environmental issues and consumers who are a part of this generation are very much keen on purchasing green products (Smith, 2010). This is partly due to the fact that this generation is more deeply involved and knowledgeable about environmental problems relative to the

older generations (Kanchanapibul et al., 2014). As a result, this generation is also the most environmentally conscious and, therefore, is deeply concerned with the environment and considers green product characteristics a relevant differentiating factor that deeply influences their purchasing decisions (Smith & Brower, 2012; Kuchinka et al., 2018; Haller et al., 2020). Even though older generations voice that environmental sustainability is a critical issue that one cannot ignore, research studies have revealed that they struggle with changing their consumption habits and it is the younger generations (Generation Z and Y) that express more eagerly a willingness to pay more for green products (Smith, 2010; Kuchinka et al., 2018; Business Wire, 2021; Nguyen & Dsouza, 2021).

2.3.2. The “Attitude-Intention-Behavior” Gap

Despite evidence highlighting consumers’ positive attitude towards environmentally sustainable products, the market share for eco-friendly products is rather low and the market is still very underdeveloped, implying that these positive attitudes influence much more the interest to purchase than the actual purchase behavior (Vermeir & Verbeke, 2006; Vlaeminck et al., 2014; Leszczyńska, 2014; Grimmer & Miles, 2016; De Daverio et al., 2020). The reality is that, regarding the purchase of green products, consumers do not always “walk their talk” since their green purchase intentions quite often do not drive actual purchasing behavior (Johnstone & Tan, 2014; Joshi & Rahman, 2015). Referred to as the “attitude-intention-behavior gap”, this topic has been receiving a lot of attention (Mostafa, 2007; Grimmer & Miles, 2016; Bashir et al., 2020; Ketelsen et al., 2020). The fact that there is an inconsistency between consumers’ buying intention and purchase behavior can lead one to think that consumer demand alone is not capable of positioning environmental sustainability as mainstream and, therefore, promoting the growth of the market for green products and contributing to sustainable development (Chkanikova & Lehner, 2015).

As acknowledged in the literature, besides the green product attribute, several other factors (e.g., price and product availability) influence consumers’ decision-making process when shopping for their groceries and, hence, allow to explain the existence of an attitude-intention-behavior gap. Naturally, a person’s values, lifestyle, and needs determine what type of products he/she intends to buy and, eventually, buys (Lu et al., 2013). However, regarding the actual purchasing moment, there are certain aspects, identified by the literature as situational factors, such as price, brand, and availability that ultimately can dictate which products one in fact purchases (Terlau & Hirsch, 2015). Therefore, a consumer may perhaps

feel strongly about buying an eco-friendly product, however, given that, for example, the price is higher than of other alternatives, it may end up not effectively buying the product, giving rise to an attitude-intention-behavior gap (Venhoeven et al., 2016).

Literature centered on studying consumers' perceptions regarding the purchase of eco-friendly products suggests two reasons that can positively influence consumers' green purchasing intention. On one hand, consumers may express an intention to purchase green products because doing so makes them feel good about themselves (positive self-image) and they believe that this signals to others that they care for the environment (Venhoeven et al., 2016). Studies have shown that many times consumers claim that they are willing to purchase environmentally friendly products (and even pay more) because they think that saying so is the most socially acceptable answer as perceived by society (Junior et al., 2015). This can resonate with what scholars call social or peer pressure, meaning the pressure to comply with social norms (Vermeir & Verbeke, 2006; Lu et al., 2013). White et al. (2019) provided evidence for the influence of peer pressure on the purchase intention of green products when the number of people choosing the environmentally sustainable option doubled when other people were observing relative to when the decision was carried out separately.

On the other hand, existing literature sheds light on the relationships between environmental knowledge, environmental concern, pro-environmental attitudes, and green purchase intention. When applying Azjen's Theory of Planned Behavior (TPB) to study consumers' sustainable behavior, evidence suggests that consumers who are more knowledgeable about environmental problems manifest a greater environmental concern which, in turn, is reflected in a positive environmental attitude and a strong intention to buy green products (Azjen, 1991; Kalafatis et al., 1999; Mostafa, 2007; Hartmann & Apaolaza-Ibáñez, 2012; Iravani et al., 2012; Junior et al., 2015; Steg et al., 2015; Yue et al., 2020). In other words, research has concluded that being conscious of environmental problems intensifies a consumer's intention to purchase eco-friendly products (Hines et al., 1987; Ishaswini & Datta, 2011; Khare, 2015; Wang et al., 2020).

Nonetheless, there are some reasons that the literature points out that can help to explain why consumers' green purchase intention sometimes does not translate into actual purchase behavior. Studying how situational factors such as price and availability can act as barriers to consumers' green purchasing behavior allows to understand why, despite having a positive attitude towards environmentally friendly products, consumers do not buy them as much, failing to materialize their green purchase intentions. The main barriers to green

purchasing behavior highlighted in the literature are higher prices, lower perceived quality, lack of availability, and lack of information (Vermeir & Verbeke, 2006; Ketelsen et al., 2020).

Regarding the variable price, research appoints it to be the most widely acknowledged barrier among consumers and has established that, when buying groceries (and, specifically, green products), this is the attribute that influences the most their buying decisions (D'Souza et al., 2007; Gan et al., 2008; Young et al., 2010; Eze & Ndubisi, 2013; Lu et al., 2013; Moser, 2016). Literature also suggests that, for consumers that care deeply about the protection of the environment, price is not such a prominent barrier (D'Souza et al., 2007). Following price, negative perceptions of quality are emphasized by many scholars as a potential barrier to green purchasing (Lu et al., 2013; Van Doorn et al., 2021). Very often consumers are skeptical about the quality of sustainable products and tend to associate them with poor quality, which demotivates purchase (Van Doorn & Verhoef, 2011; Gleim et al., 2013; Rizkalla, 2018; Van Doorn et al., 2020). In the same line of thought, existing literature also identifies the lack of availability of green products in retail stores as a strong barrier (Gleim et al., 2013). Even if consumers are interested in purchasing green products, research shows that they do not go out of their way to buy them if they are not conveniently available at the stores (Bhate & Lawler, 1997; Vermeir & Verbeke, 2006). Likewise, the lack of information that helps consumers clearly understand the benefits of eco-friendly products can make them reluctant about buying such a product, given that they are not fully informed about how the product contributes to the preservation of the environment (Gleim et al., 2013).

Taking into consideration what has been mentioned, it is possible to conclude that, even though the green attribute can influence consumers' purchasing decisions (more so for those who care deeply for the preservation of the environment), other factors such as the product's price may be more important at the moment of the buying decision (Rokka & Uusitalo, 2008; Schuitema & De Groot, 2015; Joshi & Rahman, 2015). In those circumstances, in order for companies to motivate consumers to purchase green products, they must try to ensure that these products can match up to the non-green alternatives regarding the previously mentioned context factors. This means that companies should make sustainable products more appealing to consumers through, for example, competitive prices, highlighting their remarkable quality through point-of-sale demonstrations, making available a diverse range of products in designated spaces, and properly disclosing their environmental benefits (Ginsberg & Bloom, 2004; Gleim et al., 2013; Meise et al., 2014; Vlaeminck et al., 2014; Moser, 2016; Biswas, 2016; Rizkalla, 2018; Bălan, 2020; Van Doorn et al., 2021).

The existence of an attitude-intention-behavior gap raises questions about the true importance of the green product attribute for consumers when choosing which products to buy. Consumers claim that they care for the environment and are willing to purchase environmentally sustainable products but then when given the option, they choose not to. Therefore, studying consumers' decision-making process to find out how different product characteristics influence their purchasing decisions provides companies with a better understanding of what they can do to make consumers go through with their green intentions.

2.3.3. WTP for Green Products

Consumers' degree of interest in purchasing green products can also be measured by their willingness to pay for such products. Many times consumers claim that they are motivated to buy eco-friendly products but then, are not willing to pay a premium for them and argue that the higher prices are a factor contributing to the low market share of green products.

Estimates of willingness-to-pay (WTP) assess an individual's amount of money that he/she is willing to pay for a certain product to equalize utility after a change in a product attribute (Leszczyńska, 2014; Biswas, 2016). Regarding research about the WTP for sustainable products, findings seem to be very much contradictory. On one hand, research scholars argue that, although consumers today are more concerned with the environment, they are not willing to pay a higher price and, in general, they are quite price-sensitive towards green products (Ishaswini & Datta, 2011). However, on the other hand, some articles reveal that consumers are indeed willing to pay a modest premium for eco-friendly products, but up to a point. As the price of green products moves away from the price of their conventional alternatives, the amount of money consumers are willing to pay more for green products decreases (Gan et al., 2008). Moreover, as previously highlighted, consumers that are deeply involved in environmental issues and demonstrate a higher environmental concern tend to be less sensitive to price and, therefore, are willing to pay a higher premium (Tanner & Wölfling Kast, 2003; Ishaswini & Datta, 2011; Parsa et al., 2015; Li & Kallas, 2021). Luzio and Lemke (2013) concluded that consumers are more likely to be willing to pay a higher price for green products when referring to product categories in which the average price tends to be lower, which includes grocery products such as house cleaning products and

fresh food. However, the same cannot be said regarding product categories in which the average price is high, such as cars (Luzio & Lemke, 2013).

Research data concerning consumers' willingness to pay more for sustainable products are quite diverse in different countries (Wei et al., 2018). In Japan, research has suggested that consumers are willing to pay from 8 to 22 percent more for purchasing green products (Sakagami et al., 2006). In Spain, consumers are willing to a premium of 22 up to 37 percent for eco-friendly products (Sanjuán et al., 2003). Additional evidence found that Chinese consumers are willing to pay up to 40 percent more for green products (Yu et al., 2014). In Malaysia, the average green premium was estimated at 16.93 percent (Rezai et al., 2013). Although an increasing number of scholars are devoting their attention to studying consumers' WTP regarding environmentally sustainable products, there is a lack of research for the specific case of Portugal.

The topic of environmental sustainability and its engagement in companies' business strategies and consumers' purchasing decisions is an emerging area of research. The present work aims to explore these issues and provide companies with useful insights to help them drive eco-friendly purchases from their customers. Moreover, it is of great relevance to read into what the present dissertation delves into because the analysis focuses on the particular case of the Portuguese grocery retail market, which, from what one can assess by looking at the existing literature, is not a subject matter that has been deeply analysed.

3. Research Methodology

In the present chapter, firstly, a reference to the research questions that the study aims to explore and the theoretical framework underlying them is made. Following this, there is a detailed description of the composition of the chosen data collection instrument (which is, in this case, a survey), highlighting the role each of its sections undertakes for the study. Finally, an explanation of the main model applied to study the data collected is given.

3.1. Research Questions and Theoretical Framework

As mentioned in chapter 1, the past decade has set a new green era characterized by a big wave of protests and conferences all around the world stressing the need for real and drastic change to ensure a better tomorrow for future generations. People are slowly starting to realise that their actions are severely threatening the balance of nature and are deeply affecting the lives of so many around the globe.

Following this line of thought, consumers are set to be the central pieces in this transformative movement toward a better planet through their purchasing and consumption behaviors. Therefore, it is of special relevance for companies to grasp an idea of how certain emotional and affective responses like environmental knowledge, environmental concern, environmental attitude, and green purchase intention can take part in influencing consumers' pro-environmental purchasing behavior. By understanding how these variables connect with each other, companies can work in ways to promote the purchase of green products (Kuchinka et al., 2018).

In accordance with this, the present study had its theoretical foundation in the theory of planned behavior (TPB) (the same perspective in economics is given by the theory of buyer behavior first presented by Howard and Sheth in 1969) (Howard & Sheth, 1969; Hunt & Pappas, 1972; Ajzen, 1991; Kalafatis et al., 1999). Existing literature shedding light on the TPB has argued that this theory plays a crucial part in better understanding green purchase behavior (Mishal et al., 2017). In the TPB, it is developed the idea that consumer behavior is the result of consecutive cause-effect relationships between several factors. The TPB describes that, by this order of events, beliefs develop attitudes, then, attitudes create an intention, and an intention motivates a certain behavior (Grimmer & Miles, 2016).

Specifically, with the aim of analysing consumers' green purchasing behavior, some authors have applied the TPB and established the following cause-effect relationships.

Firstly, acquiring environmental knowledge leads to greater environmental awareness that is projected onto a greater concern for the environment (Yue et al., 2020). Then, being environmentally concerned is mirrored in a pro-environmental attitude, that, in turn, manifests itself in an intention to purchase green products. And, lastly, this intention can drive actual green purchase behavior (Mostafa, 2007; Iravani et al., 2012).

Essentially, existing literature suggests that consumers that are more knowledgeable about environmental issues and, therefore, are more aware of environmental problems, are more conscious about their purchases, thus, more likely to purchase green products (Hines et al., 1987; Ishaswini & Datta, 2011; Khare, 2015). In parallel to that, these consumers tend to exhibit a higher level of environmental concern and a pro-environmental attitude, which are positively correlated to green purchase intention (Mostafa, 2007; Hartmann & Apaolaza-Ibáñez, 2012; Iravana et al., 2012; Junior et al., 2015; Steg et al., 2015). Regarding the final relationship between purchase intention and actual behavior, evidence shows a weak correlation, giving rise to the already mentioned attitude-intention-behavior gap (Mostafa, 2007; Grimmer & Miles, 2016; Bashir et al., 2020; Ketelsen et al., 2020).

Keeping this in mind, the present study aimed to understand if Portuguese consumers are indeed willing to change their purchasing behaviors towards more sustainable products and to what extent their concern for the environment and their motivation to become “greener” is translated into their willingness to pay for an eco-friendly product. This study sought to fathom how Portuguese consumers feel about the topic of sustainability and how the presence of the green attribute can affect their purchasing decisions.

To that end, the present work was appointed to clarify the following four research questions.

RS1: Is there any statistical relationship between the level of environmental concern and degree of price sensitivity, i.e., do Portuguese consumers who demonstrate to be more concerned with the environment exhibit lower sensitivity to price changes?

RS2: Are Portuguese consumers’ green purchase intention (showcased by a greater level of environmental concern) reflected in their decision-making process? Do Portuguese consumers value more a product that is eco-friendly, versus a non-green alternative?

RS3: How much are Portuguese consumers willing to pay more for green products?

RS4: Are consumers who portray to be more concerned with the environment willing to pay a higher price for eco-friendly products?

3.2. Survey Design

Given that the present study constituted a quantitative research, the predominant method to collect data is through a survey (Watson, 2015). Therefore, the research instrument chosen to be used to collect the data necessary to answer the previously mentioned research questions was a structured questionnaire composed of three sections that will be thoroughly explained throughout this chapter.

The first section comprised five simple sociodemographic questions about gender, year of birth, region of residence, number of family members, and total household yearly salary. This group of questions allowed to characterize the sample and check for any heterogeneities between individuals (Amaya-amaya et al., 2008; Flynn et al., 2015). For example, it was possible to test if younger generations are more concerned with the state of the environment than older generations. Since the questionnaire was displayed to respondents according to established quotas regarding some of these variables (namely age, gender, and region), these questions were placed in the beginning. This way, if sampling quotas were filled, individuals were screened out without having to answer all the remaining questions (Mariel et al., 2021).

The second section consisted of an attitudinal study designed to assess respondents' environmental attitudes and measure their level of environmental concern. As mentioned before, environmental attitudes are one of the main variables explaining consumers' green purchase intention and behavior (Kill et al., 2014; Beltrán, 2019; Chen et al., 2022). Likewise, research suggests that environmental attitudes are directly influenced by the degree of environmental concern, and consumers who express more concern for the environment tend to feel strongly about the purchase of green products (Joshi, 2016; Chen et al., 2022). Thus, it was of great relevance to study consumers' attitudes concerning the environment to understand their perspective on this topic and how it can influence their purchasing behavior.

In the study, environmental attitudes were captured by the New Ecological Paradigm (NEP) scale (Kill et al., 2014). The scale, firstly developed in 1978 by Dunlap and Van Liere and then revised in 2000, is the standard and most widely used measure of environmental attitudes (Hawcroft & Milfont, 2010). This environmental attitudes scale has been marked as the scale with the highest number of reference citations among other well-known selected scales, thus, highlighting its universal use and acceptance amongst research scholars. This suggests that, despite being a relatively old scale, there is still a consensus regarding its credibility and research validity (Cruz & Manata, 2020).

The NEP scale serves as a measure of environmental concern by assessing one's point of view on the relationship between the environment and human beings (Dunlap et al., 2000; Sudbury-Riley et al., 2014). It comprises 15 items revolving around the subjects of limits to growth, the balance of nature, the rights of plants and animals, and the ecological crisis (Kuchinka et al., 2018). A 5-point Likert scale (from 1= Strongly Disagree to 5= Strongly Agree) was used to evaluate the respondents' opinions on each statement (Dunlap et al., 2000; Zhushi-Etemi et al., 2020). Likert scales are known for being extensively used in attitudinal studies and they allow for the interpretation of both the direction and the intensity of the respondents' attitudes (Maitland, 2009). Given that most articles exploring the NEP scale have used the 5-point scale format, including the original authors themselves, it was adequate to maintain the same layout to ensure consistency (Dunlap et al., 2000; Hawcroft & Milfont, 2010).

For each respondent, an individual environmental attitudes score was calculated as the sum of all items, forming a single NEP score ranging from 15 to 75. Including the original authors of the scale themselves, most recent articles exploring the NEP scale (and especially the revised version) have also treated it as a summated scale (Dunlap & Van Liere, 1978; Dunlap et al., 2000; Hawcroft & Milfont, 2010; Zhushi-Etemi et al., 2020). A high individual NEP score indicates that the respondent is conscious and sensitive to environmental issues, concerned with the state of the environment, and determined to live in a sustainable manner. On the contrary, a low individual NEP score reveals a low level of environmental concern, thus, little motivation to adopt a pro-environmental behavior (Mostafa, 2007; Kuchinka et al., 2018; Zhushi-Etemi et al., 2020).

The choice to use the NEP scale is related to its universal popularity and the fact that several research articles have found this measure to be positively correlated with pro-environmental behavior, with evidence showing that individuals that score high on the NEP scale tend to behave more ecologically (Olli et al., 2001; Corraliza et al., 2013; Freire et al., 2021). Furthermore, this scale has proven to be a reliable instrument to measure environmental attitudes, with high internal consistency and validity (Dunlap et al., 2000; Hawcroft & Milfont, 2010; Sudbury-Riley et al., 2014; Kuchinka et al., 2018; Wang et al., 2020). For these reasons and considering the topics that the present study aimed to explore, it seemed appropriate to use this scale. Since the survey was entirely written in Portuguese, the items of the NEP scale had to be translated, but it was ensured that everything held the same meaning as the original content.

With data collected from this section of the questionnaire, the first step was to calculate the mean NEP score to fathom Portuguese consumers' average level of environmental concern and, then, check for heterogeneities in the NEP score among respondents, specifically regarding gender, year of birth, and region of residence. Research findings are quite antagonistic regarding these heterogeneities. For example, while most studies have concluded that younger generations tend to be more environmentally conscious than older generations, others have found that age does not have an influence on environmental attitudes (Dunlap et al., 2000; Diamantopoulos et al., 2003; Hawcroft & Milfont, 2010; Wiernik et al., 2013; Kuchinka et al., 2018). Thus, it was relevant to study differences in the NEP scale both regarding gender, year of birth, and region of residence to be able to draw some conclusions for the specific case of Portugal. In addition, it was also of interest to see if there was any relationship between individuals' NEP scores and level of price sensitivity.

In the third and final section of the questionnaire, a discrete choice experiment (DCE), also known as choice-based conjoint (CBC) analysis, was applied as a stated preference elicitation method. In the DCE format used, every respondent was presented with 12 different choice scenarios, each including three unlabeled product alternatives. Each alternative was characterized by a set of pre-defined attributes and alternatives varied according to established attribute-levels. Then, in each choice set, respondents were asked two different questions, presented below in Table 3.1. The second question was made with the intention to understand if consumers would consider buying any of the products or, when choosing not to buy any of the alternatives, if that meant that the best option was just chosen based on being the best of the worst, in terms of the individual's personal preferences. The inclusion of the option "neither of the above" was intended to make the choice context more relatable to a real purchasing situation, where consumers can ultimately decide to not buy any of the products presented to them (Mangham et al., 2008).

Table 3.1 Choice set questions ¹

Question 1. Among the three product alternatives, choose the one you feel is the best and the worst.

	Product 1	Product 2	Product 3
Best	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Worst	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Question 2. From the products presented, please indicate which one(s) you would consider buying.

Product 1 Product 2 Product 3 None of the above

By analysing the data collected by the DCE, it was possible to infer values from the trade-off decisions made by individuals when choosing between different alternatives (DeShazo et al., 2015). In other words, studying respondents' preferences allowed one to estimate the importance and contribution of each attribute (and, specifically, of each of their levels) to their utility functions, and, from that, their WTP associated with each attribute was calculated (Carlsson & Martinsson, 2003; Tran et al., 2022).

Even though individuals were presented with hypothetical product alternatives, and this was a controlled experiment, it was important to ensure that the DCE design would "realistically mimic a market experience" in which consumers have to choose between different competing products (Ben-Akiva et al., 2019). This is because the closer the DCE mirrors the reality of consumers when they go to the market to buy their groceries, the higher the validity of the experiment (Louviere et al., 2000).

Given that the main research objective was to estimate the WTP to buy a green product, it made sense that the decision-making context would be the purchase of a grocery product. In general, evidence shows that DCEs work best when the product being considered is relatively familiar and purchased quite frequently (McFadden, 2013).

¹ Translated from Portuguese.

Accordingly, before presenting respondents with the choice sets, a small introduction was made, which included a description of the purchasing context. It asked respondents to imagine themselves at the grocery store, looking to buy a new dish detergent, being confronted with these different alternatives, and having to make various decisions (Ali & Ronaldson, 2012).

Fundamentally, when conducting a DCE, there are multiple steps that need to be followed. Ryan and Hughes (1997) have identified five stages. Firstly, the different attributes that will help define each alternative need to be selected. Then, there is the need to establish the numerous levels from which attributes will vary according to each alternative. Next, through experimental design, choice sets are constructed with attribute-levels being combined to form each of the alternatives. Following this, the method through which responses are collected is chosen. And, finally, data must be submitted to an econometric analysis so one is able to draw any concrete conclusions from it.

When selecting which attributes to include in the DCE, it is important to think about the consumers' choice process and the attributes that would likely be relevant for them when making their purchasing decisions. For this reason, the purchasing context had to be taken into consideration (Amaya-amaya et al., 2008; Ali & Ronaldson, 2012). Thus, the selected attributes to be contemplated in the DCE were price, cleaning efficiency, brand, fragrance, shine, eco-friendly, delicacy to the skin, and ease of use. Naturally, the attribute "eco-friendly" had to be included given the main goal of the study. Research on DCEs has established a total of 10 attributes as the limit from which respondents would then incur additional cognitive effort to assimilate all the information and could start ignoring some of the attributes as a strategy to simplify the choice task (Louviere et al., 2000; Mangham et al., 2008). Therefore, it was important that the number of attributes would fall behind this limit to minimize the risk of this happening.

Concerning the choice of the attribute-levels, almost every attribute varied according to two levels to make everything relatively simple and easy to understand. It was crucial to ensure that the choice task was straightforward so that respondents were able to comprehend and consider all information given (Louviere et al., 2000). In some cases (i.e., attributes "brand" and "fragrance"), it did not make sense to include more levels since these were not the study's prime attributes. On the contrary, when taking into consideration the main research objective of this DCE, the attribute "price" had to include more levels since it is an important variable for the study, namely for the estimation of the WTPs (Sanko, 2001; Gyrd-

Hansen & Skjoldborg, 2008; IMVF, 2021). Additionally, including more levels allows one to better understand the “true relationship between an attribute and respondents’ utility” (Amaya-amaya et al., 2008, p. 18). All values that the “price” attribute could assume were taken from a range of prices available in the market, so to make the DCE more realistic, which, in turn, leads to more precise parameter estimates (Hall et al., 2004). Regarding all qualitative attributes, a simple explanation about their levels was given so to reduce any ambiguity and ensure that respondents fully understood their meaning (Amaya-amaya et al., 2008). This description was added to every choice scenario to give respondents the option to recall any of that information if they needed it. Table 3.2 details the attributes and the levels they can take on.

Table 3.2

Attributes

Attribute	Levels
Price	0.89€; 1.79€; 2.69€; 3.59€; 4.49€; 5.39€
Cleaning Efficiency	Efficient; Not efficient
Brand	Store brand; Exclusive brand
Fragrance	With fragrance; Without fragrance
Shine	Leaves shine; Does not leave shine
Eco-friendly	Eco-friendly; Not eco-friendly
Delicacy to the skin	Delicate; Not delicate
Ease of use	Easy to use; Difficult to use

The previously mentioned attribute-levels were then combined to form different alternatives according to a design matrix (Carson & Louviere, 2011). Roughly, a complete factorial design of six two-level attributes and one six-level attribute forms 384 different possible combinations. However, it would undoubtedly be too burdensome for respondents to be presented with so many alternatives (Louviere et al., 2000). For that reason, the best solution is to use a subset of the complete design, to reduce the number of choices presented to individuals. Concerning one such type of design (also known as an orthogonal array), main attribute effects and parameters of interest are estimated usually under the assumption that

interaction effects are (often) not significant (Louviere et al., 2000; Street et al., 2008). Examples of experimental designs can be retrieved from web pages made available by software companies (such as the one used in the study)² (Mangham et al., 2008). Given that the DCE design incorporated eight attributes with two and six levels ($2^6 * 6^1$), the selected orthogonal array had to integrate this combination. In order to find out the number of total profiles to be displayed to respondents and then, select the suitable design matrix, it was necessary to first decide how many choice sets respondents were going to be presented with. On one hand, the higher the number of choice sets, the more observations are collected, and the more meaningful can be the conclusions taken from the data analysis. On the other hand, increasing the number of choice sets will also demand additional cognitive effort from the respondent, which can mean lower quality of data and/or a lower response rate. This is explained by the fact that, as respondents become more fatigued, there is a higher probability that they will start making more random errors or relying on simplifying strategies to ease the choice task (Louviere et al., 2000; Flynn et al., 2015). Consequently, respondents' decision process and associated decision criteria may shift from one choice task to another, putting into question the reliability and consistency of the data collected. Hence, there is a clear trade-off between statistical efficiency and task complexity (Bech et al., 2011). Even though there is no consensus regarding the “perfect” number of choice sets, Mangham et al. (2008) stated that, traditionally, DCEs consider up to 18 different scenarios per respondent. In addition, Coast et al. (2006) found no differences in response rates when using 8 and 16 comparison sets. Therefore, when taking everything into account, a design with 36 runs/profiles was considered to be adequate given the purpose of the study. Beyond looking at main effects, if one also desired to study interaction effects between two or more attributes, the design would have to include more profiles.

In conclusion, the DCE was composed of 36 products, grouped into 12 blocks with 3 alternatives each. The decision to feature three alternatives in each choice set was made taking into consideration the underlying trade-off between informational value and cognitive burden. After obtaining the design matrix, a “find and replace” process was carried out to convert the design codes into the corresponding attribute-levels (Louviere et al., 2000). An example of a choice scenario is presented below in Table 3.3. As it is possible to observe from this table, the alternatives are unlabeled and simply generic (e.g., “Product 1”), so

² Link used to retrieve the experimental design: <https://support.sas.com/techsup/technote/ts723.pdf>

respondents were not able to retrieve any additional information beyond the one provided by the attributes, thus, presumably, more focus was given to fully understanding the attributes, which is a key essential point (Amaya-amaya et al., 2008).

Table 3.3
Sample scenario

Attribute	Product 1	Product 2	Product 3
Price	1.79€	3.59€	5.39€
Cleaning Efficiency	Efficient	Efficient	Not efficient
Brand	Store brand	Store brand	Exclusive brand
Fragrance	With fragrance	Without fragrance	With fragrance
Shine	Leaves shine	Does not leave shine	Leaves shine
Eco-friendly	Eco-friendly	Not eco-friendly	Not eco-friendly
Delicacy to the skin	Delicate	Delicate	Not delicate
Ease of use	Easy to use	Difficult to use	Easy to use

After forming the choice scenarios, the next step was to verify the existence of dominated and dominant profiles, meaning alternatives in which all attributes assume the worst and best levels, respectively. These types of alternatives should be revised since they will always be picked as the least and most preferred options, therefore, they do not provide any new information, and keeping them leads to underestimation of the parameter estimates (Louviere et al., 2000). In the present study, there were no dominated or dominant alternatives, hence, the design matrix remained as it was originally.

Lastly, as mentioned before, with regards to each choice scenario, two separate questions were made, which demanded respondents to choose the best and worst product and select the product they would consider, in fact, buying.

The purpose of including this section in the questionnaire was four-fold. Firstly, analysing consumers' choices from the DCE was crucial to grasp an idea of how Portuguese consumers perceive each of the product attributes presented and how they can influence their purchasing decisions. By looking at the estimated coefficients, it was possible to understand if, aligned with their concern for the environment, consumers value positively a

product that is environmentally sustainable, thus, meaning that buying a green product versus purchasing a non-green one would bring them a higher utility level. If this is not the case, one can conclude that Portuguese consumers, despite voicing their concern for the environment, are not mirroring a pro-environmental attitude in their purchasing behavior. A second intention was to calculate the rate of substitution (RS) between the attributes “price” and “eco-friendly”. This allowed an understanding of if and how much Portuguese consumers are willing to pay more to purchase green products (relative to their non-green counterparts). In other words, it provided information regarding respondents’ real commitment to becoming green consumers. Keeping this in mind, stated preference methods have proven to be the main preference elicitation method to estimate economic quantities associated with preference parameters, such as marginal rates of substitution (Carson & Louviere, 2011; Bliemer & Rose, 2005). Then, having calculated the WTP estimates, the next goal was to look for differences between distinct consumer segments. For example, to explore if individuals with higher earnings or a bigger family are willing to pay more to purchase green products (Laroche et al., 2001). Finally, it was also of great relevance to examine a possible relationship between individuals’ NEP scores and WTP estimates given that attitudes have been found to be the main predictors of consumers’ willingness to spend more to buy green products (Laroche et al., 2001). The objective was to determine if consumers who exhibited a higher level of environmental concern (as measured by the NEP scale score) were associated with a higher green premium, just as other research studies suggest (Bang et al., 2000; Tanner & Wölfing Kast, 2003; Ndebele & Marsh, 2014; Hahnel et al., 2014; Ntanos et al., 2019). By doing so, a relationship between sections two and three of the questionnaire was established.

3.3. Data Collection

As highlighted in chapter 1, if companies desire to motivate consumers to carry out more eco-friendly consumption and purchasing habits, it is fundamentally important to understand how customers think and make decisions about which products to buy. By doing so, companies will be able to design more effective strategies to promote pro-environmental behavior and push consumers to purchase more green products (Kuchinka et al., 2018). Considering this, self-report questionnaires tend to be the chosen survey design if one aims to comprehend what drives consumer behavior and measure their attitudes concerning the environment (Milfont & Duckitt, 2010; Domingues & Gonçalves, 2018). This type of

questionnaire encompasses questions about respondents' personal opinions and attitudes (Korb, 2011). However, when resorting to self-report questionnaires, researchers must keep in mind that, many times, respondents feel enticed to provide answers that appear to be more socially acceptable, even when their true opinions and feelings are different, which can bias the results of the study (Junior et al., 2015). Respondents may try to portray a better image of themselves by reporting overly positive environmental attitudes and declaring vigorously their green purchase intentions. This is called the social desirability bias (Johnstone & Tan, 2014; Schuitema & De Groot, 2015). For researchers, it is not possible to know with certainty if and to what extent this response bias has influenced the results. Nevertheless, one can try to minimize the risk of it occurring. Thus, it was decided that the survey was going to be submitted on an online platform with no need for the presence of interviewers to prevent respondents from feeling pressured to reply with what they consider to be socially desirable answers. Moreover, answers were given anonymously so that respondents would feel more comfortable about giving their honest opinions. Notwithstanding, because this was a self-administered questionnaire, it was important that there were no ambiguous questions and everything was clearly explained to ensure that individuals would not have different interpretations from the one intended (Demetriou et al., 2015).

Online surveys allow data to be collected very quickly and effortlessly and are proving to be quite an effective and reliable instrument to gather data when targeting large sample sizes (Ndebele & Marsh, 2014). Furthermore, with web surveys (likewise with other types of surveys), there is the possibility to apply quotas and screen out respondents, which helps to ensure a balance from the responses gathered and target specifically and more cost-efficiently the individuals to be questioned. Specifically, for this study, quotas on gender, age, and region of residence were established. This enabled the composition of the sample to resemble (in the same proportion) the composition of the total population regarding those variables (Malhotra, 2010). Consequently, richer and more meaningful insights were able to be retrieved from the data collected. Adding to this, since, in Portugal, the internet penetration rate was marked at 84,2% in 2021, the use of an online survey appeared to be the most suitable option for the present study (Kemp, 2021).

Given that the study's main research objective was to estimate Portuguese consumers' WTP to purchase a green product, the survey was targeted to both female and male individuals living in Continental Portugal between the ages of 25 and 65 who are the primary grocery shoppers or equally participate in the grocery purchase decisions within their

households. The context of the DCE had to be taken into consideration when defining the target population since the questions were quite specific to a certain purchasing situation. Likewise, the survey had to be answered by individuals that go to the grocery store quite frequently and, therefore, are quite acquainted with this type of choice task, and, in their minds, it is very clear what factors influence their purchasing decisions the most. From the defined sampling frame, a finite sample of 500 respondents was set as the target sample size. When estimating sample size, one must consider that, concerning DCEs, while a small sample (i.e., of 300 respondents) may perhaps be sufficient to obtain statistically significant attribute coefficients, a larger sample may be needed to study subgroup heterogeneities. On a more general note, Marie et al. (2021) state that sample sizes of 300 to 500 individuals appear to be the standard sample dimension. Since the present study aimed to study differences in environmental attitudes as well as WTP estimates and attribute valuations, it was decided that the sample size would be exactly 500 respondents.

After the questionnaire was structured, it was distributed by an online survey panel company named Cint. Cint has the world's largest consumer network for digital survey sampling studies and is known for its high-quality data standards. Just in Portugal, they have over 800.000 panelists. The decision to choose this company to administer the survey was made considering these facts and the underlying project cost. The fieldwork period extended from the 22nd of June until the 12th of July 2022.

3.4. The Stated Preference Method

In general, when talking about preference-based valuation methods, they can either be employed on revealed preference data or stated preference data. The difference between the two is rather simple. While revealed preference methods rely on data from observed consumer behavior, reflected in actual market purchasing decisions, stated preference data is obtained through controlled experiments, designed to depict a real market setting and where consumers are presented with hypothetical alternatives (Ali & Ronaldson, 2012). Despite both methods being widely used in consumer research studies and, contrary to stated preference methods, revealed preference methods resort to real market data (meaning greater data reliability and face validity), they also present some limitations. The fact that, in the marketplace, due to intense market competition, products tend to be quite similar and there is low variability of attribute-levels (e.g., prices are very much alike among products of the same category), makes it harder to get a clear idea of consumers' preferences and what

features they value the most when choosing to buy a product. Likewise, some product attributes such as price and brand tend to be somewhat correlated with private label products being (a lot of the time, if not always) more expensive than white label products. Consequently, one cannot fully understand the trade-offs that consumers make when carrying out their purchasing decisions (Louviere et al., 2000; Sanko, 2001). In stated preference methods, given that attribute-levels vary systematically and independently across different product alternatives, this problem does not occur. Moreover, this kind of method can include different products from the ones available in the market, which enables more data to be retrieved about consumers' real preferences and is especially relevant when wanting to study the demand for a new product (Louviere et al., 2000). For these reasons, stated choice surveys have gained a lot of popularity and have been extensively applied across different research areas such as environmental economics, energy economics, health economics, transportation economics, and telecommunication economics (Morey et al., 2007; Ryan et al., 2008; Ndebele & Marsh, 2014; Hahnel et al., 2014; DeShazo et al., 2015; Confraria et al., 2017).

In addition, when studying stated preference methods, these can be classified as cardinal or ordinal. In cardinal methods, respondents are asked to value the amount to which one alternative is preferred over another, whereas in ordinal methods, respondents merely have to order two or more alternatives according to their preferences. Particularly, the advantages of using ordinal methods relate to low task complexity, ease to administer the survey, and high data reliability (Ali & Ronaldson, 2012). Two widely used cardinal and ordinal methods are the contingent valuation method (CVM) and the DCE, respectively. In a CVM, consumers value a specific product when asked how much they would be willing to spend to purchase it. On the contrary, a DCE is used to value a specific product characteristic and estimates of willingness to pay are obtained indirectly by inferring consumers' preferences from their choices rather than explicitly, as in the CVM (Gerard et al., 2008).

All in all, stated preference methods and, more specifically, DCEs are valuable research tools if one desires to comprehend consumers' decision process and understand how they value different product characteristics (in terms of the utility they can retrieve from an alternative). It provides both companies and marketers with useful information on how to better position themselves in the market and more efficiently target consumers to influence their behaviors. Specifically, this type of data can help them develop appealing

product designs as well as effective pricing and communication strategies to lead consumers into having more sustainable purchasing and consumption habits (Louviere et al., 2000).

As mentioned in chapter 3.2, in the third section of the questionnaire, which comprised the DCE, individuals were asked to choose their most and least preferred product from a bundle of three alternatives in each choice set presented. Relative to the traditional DCE, where individuals are asked only to select the best alternative, in the present study, a multi-profile best-worst scaling (BWS) method was applied. This method, introduced by Louviere and Woodworth in 1990, allows more data to be retrieved (an order of preferences concerning the alternatives is possible to be established) without an increase in the cognitive burden since choosing the most and least favorite options remains still an easy decision to make. In turn, the gathering of more statistical data enables analysts to get a better perception of consumers' decision processes and underlying utility functions (Ali & Ronaldson, 2012; Louviere et al., 2015). Moreover, asking respondents to choose just one option for the best and worst alternative forces them to analyse each product in the choice set with more attention and thoroughly discriminate between the different attributes, thus, theoretically, increasing the validity and reliability of the data collected (Soutar et al., 2015).

Regarding respondents' choices, it was presumed that they would consider all the information given and then, pick the alternatives that provided them with the greatest and lowest utility of the bundle (Ali & Ronaldson, 2012). This is a valid assumption to make given DCEs' theoretical framework association with Lancaster's theory of value and the utility-maximizing consumer hypothesis (McFadden, 2013). While in the classical consumer theory consumers derive utility from the products themselves (utility level varies with the quantity consumed of the product), DCEs rely on the idea that the level of utility that can be retrieved from an alternative is determined by its attributes and underlying levels (Louviere et al., 2000; Amaya-amaya et al., 2008). In this study, this means that the utility of an alternative depends on the separate marginal utilities linked to each attribute and attribute-level (Ali & Ronaldson, 2012). Therefore, by analysing consumers' choice behavior, it was possible to infer their preferences and estimate how much they value each attribute (and, more specifically, each of its levels) in terms of the level of utility they can derive from a certain alternative. This is described in the random utility theory (RUT), where utility depends on both an observable and non-observable component. The utility function can be represented as follows (equation 3.1).

$$U_{jn} = V_{jn} + \varepsilon_{jn} \quad (3.1)$$

Where U_{jn} represents total utility derived from alternative j of individual n , V_{jn} is the observable systematic component and ε_{jn} is the non-observable random component (McFadden, 1973; Louviere et al., 2000; Gyrd-Hansen & Skjoldborg, 2008). The random factor can be explained by unobserved aspects affecting choice (such as consumer or product characteristics that were not considered and, therefore, have not been captured by the model) or measurement errors (McFadden & Train, 2000). Below, equation 3.2 displays how the utility function can be further decomposed, regarding the deterministic component.

$$V_{jn} = \sum_{k=1}^K \beta_{nk} X_{jk} \quad (3.2)$$

Where β_{nk} is a vector of attribute parameters accounting for the contribution of attribute k in total utility, and X_{jk} denotes the generic attribute k of alternative j (Hauber et al., 2016). Since all alternatives included in the experiment were generic (as already explained in chapter 3.2), the attribute coefficients were estimated as generic (or non-alternative-specific) as well, meaning that the weights of each attribute-level on utility were the same independently of the alternative (Carlsson & Martinsson, 2003; Bliemer & Rose, 2005). Thereby, the component β_{nk} does not include a reference to an alternative j . When translating for the present study, the RUT assumes that there is a vector $\beta = (\beta_1, \dots, \beta_k)$, such that:

$$V_{jn} = \beta_1 \text{Price} + \beta_2 \text{Cleaning Efficiency} + \beta_3 \text{Brand} + \beta_4 \text{Fragrance} + \beta_5 \text{Shine} + \beta_6 \text{Eco-friendly} + \beta_7 \text{Delicacy to the Skin} + \beta_8 \text{Ease of Use} \quad (3.3)$$

Later in this chapter, it will be explained how the main effect of an attribute can be estimated from the levels that it is associated with. This is a pertinent explanation since what one is trying to measure is the effect on utility of a change in an attribute-level when moving from one alternative to another.

According to the RUT, an individual chooses an alternative j as the best option if that alternative maximizes his utility relative to the other alternatives from choice set c . This means that alternative j will be chosen if:

$$U_{jn} > U_{zn} \quad j \neq z \in c$$

This, in turn, means that:

$$(V_{jn} + \varepsilon_{jn}) > (V_{zn} + \varepsilon_{zn})$$

And,

$$(V_{jn} - V_{zn}) > (\varepsilon_{zn} - \varepsilon_{jn}) \quad (3.4)$$

However, given the existence of an unobservable component on the utility function, which implies that the researcher cannot fully get a sense of individuals' decision process and what factors are influencing their choices, it is not possible to determine with certainty that the utility of an alternative i is greater than the utility of another. Since $(\varepsilon_{kn} - \varepsilon_{in})$ is not observable, one cannot know exactly if equation 3.4 is met. Hence, choices made by individuals can only be explained up to a probability of occurrence. With that being said, the probability of individual n choosing alternative j from the bundle of J different alternatives is given by the equation presented below (assuming that error terms follow a distribution of extreme value type I or Gumbel) (Louviere et al., 2000).

$$P_{jn} = \frac{\exp(V_{jn})}{\sum_{i=1}^J \exp(V_{in})} \quad j = 1, \dots, J \quad (3.5)$$

Regarding data analysis, most DCE studies have resorted to McFadden's multinomial logit (MNL) model (Green et al., 2001; Amaya-amaya et al., 2008; Ali & Ronaldson, 2012). The MNL model can also be called a difference-in-attributes model since a measure of a change in an attribute level is estimated. This means that this model, among other things, serves to calculate how much utility increases/decreases when there is a change in a particular attribute-level (everything else constant) (Louviere et al., 2000).

The MNL model was estimated using maximum likelihood methods. The likelihood function is represented in equation 3.6 (Amaya-amaya et al., 2008).

$$L = \prod_{n=1}^N \prod_{j \in c} P_j^{y_{jn}} \quad (3.6)$$

Where N is the sample size and y_{jn} takes the number 1 if individual n ($n=1, \dots, N$) chooses alternative j from choice set c, and the number 0 if otherwise.

Preference parameters were obtained by maximizing the log-likelihood function (equation 3.7) (Amaya-amaya et al., 2008).

$$\text{LnL} = \sum_{n=1}^N \sum_{j \in c} y_{jn} (\ln(P_j)) = \sum_{n=1}^N \sum_{j \in c} y_{jn} \left(\beta' X_{jk} - \ln \sum_{i \in c} \exp(\beta' X_{ik}) \right) \quad (3.7)$$

Adding to the fact that the MNL model is the most widely used model in DCE studies, existing literature also references it as quite simple and easy to estimate (Louviere et al., 2000).

Regarding the sign of the parameter estimates, one should expect that, for example, the coefficient for the attribute “price” would be negative since a higher price means a loss of income, which translates into a decrease in utility. A negative price coefficient implies that, for a given alternative, when changing the level of the attribute “price” to a higher cost (and keeping everything else constant), the probability that the alternative will be chosen as the preferred option decreases (Louviere et al., 2000; Mariel et al., 2021). Likewise, for consumers who are more price-sensitive and, therefore, react more deeply to price changes, the coefficient should be more depressed than for those who are less sensitive to price (Wang et al., 2020).

After obtaining the coefficient estimates, the rate of substitution between the attributes “price” and “eco-friendly”, i.e., the willingness to pay for a change in the attribute “eco-friendly”, was calculated. When considering conducting a DCE study, certainly, the marginal rate of substitution (MRS) and WTP estimates are two valuable and insightful outcomes that one can retrieve. Specifically, the MRS between two attributes x and y expresses how much a consumer would be willing to give up on x for an improvement on y

and is given by the negative ratio of their respective marginal utilities (i.e., the coefficients, β , of both attributes) (equation 3.8) (Amaya-amaya et al.,2008). When the denominator of equation 3.8 is the coefficient of a cost attribute (expressed in monetary units) (e.g., price), the value of the WTP can be calculated (Louviere et al., 2000; Ryan et al., 2008).

$$\text{MRS}_x^y = -\frac{\partial V_{jn} / \partial y}{\partial V_{jn} / \partial x} = -\frac{\hat{\beta}_y}{\hat{\beta}_x} \quad (3.8)$$

As it can be seen from equation 3.3, the utility function is expressed in terms of the attribute-levels associated with the alternative and their designated coefficients. The decision to merely study the main effects of the attributes (and not interaction effects between different attributes as well) was made given that these are the effects of primary research interest when applying stated preference methods (Louviere et al., 2000). Moreover, since the desired outcome to be retrieved from the DCE was to estimate Portuguese consumers' WTP to purchase green products, the decision to solely conduct a main effects analysis served appropriately that purpose. Nonetheless, when studying only the main effects, it should be kept in mind that this does not imply that interaction effects are zero or non-significant. In fact, if the interaction effects that were omitted and, therefore, were not captured by the model are significant, then, the results will be biased, and coefficients will not entirely represent the contribution of a single attribute on the utility function (this is called the omitted effect bias).

When talking about DCEs and the RUT theoretical framework, it is also important to introduce the concept of the main effect of an attribute and detail the underlying process to calculate it. When studying main effects, it is implied that the level of utility that an individual retrieves from an alternative depends on the level that each attribute takes (Amaya-amaya et al., 2008). Keeping this in mind, the MNL model is estimated considering the levels of each attribute, so that the estimated coefficients express the increase or decrease (if the sign of the coefficient is positive or negative, respectively) in utility relative to a change in the level of the attribute (with respect to the reference level) when moving from one alternative to another (Mangham et al., 2008). Therefore, a positive (negative) coefficient indicates that the attribute level associated with that coefficient is preferred over the reference level (Zhao et al., 2018).

4. Results and Discussion

Regarding chapter 4, a descriptive analysis of the composition of the sample that was analysed is firstly given, followed by a presentation of the results obtained from the data analysis. Alongside this, there is an exposition of the conclusions that can be drawn from those results.

By looking at Table 4.1, it is possible to observe the sample distribution, according to gender, year of birth, region of residence, number of people living in the household, and total yearly household income. Regarding gender, the sample is rather balanced, with 50.8% of respondents being female, and 49.2% being male. With respect to the demographic variable “year of birth” and considering that the survey was targeted at consumers from the age of 25 to 65, it was decided to group respondents according to this variable, establishing the following generations: baby boomers (1946-1964), generation X (1965-1980), and generation Y (1981-1997). Despite the year 1997 being a part of generation Z, given that only 0.8% of respondents were born in that year, it would not make sense to create a separate generation with not enough amount of data to be able to make statistically significant inferences regarding this segment, therefore, it was included in generation Y. The decision to form such groups allowed the analysis to be performed more easily and aligns with what other research scholars have done when studying the same topic of consumer sustainable consumption behavior. Concerning the demographic aspect of “region of residence”, answers were collected with regards to Continental Portugal and the NUTS II classification, with most of them coming from Portugal’s great urban centers, namely the North, Center, and Lisbon Metropolitan Area. The following demographic questions respecting the number of people living in the household and total household yearly income were included keeping in mind the second part of the analysis of the results, in relation to the information data gathered from the DCE, as it shall be seen further in the present section.

Table 4.1
Sampling demographic characteristics (N=500)

Demographic characteristics	Absolute frequency (N)	Relative frequency (%)
Gender		

	Feminine	254	50,8%
	Masculine	246	49,2%
<hr/>			
Year of birth			
	Baby Boomers	70	14%
	Generation X	213	42,6%
	Generation Y	217	43,4%
<hr/>			
Region of residence			
	North	115	23%
	Center	117	23,4%
	Lisbon Metropolitan Area	117	23,4%
	Alentejo	68	13,6%
	Algarve	83	16,6%
<hr/>			
Number of people in the household			
	1	59	11,8%
	2	140	28%
	3	162	32,4%
	4	107	21,4%
	5 or more	32	6,4%
<hr/>			
Yearly household income			
	Less than 5.000€	20	4%
	5.000€-10.000€	55	11%
	10.000€-13.500€	66	13,2%
	13.500€-19.000€	114	22,8%
	19.000€-32.500€	161	32,2%
	More than 32.500€	84	16,8%

As mentioned previously in chapter 3.2., the second section of the questionnaire comprised an environmental attitudes measurement scale, the so-called NEP scale, to understand Portuguese consumers' views and perceptions regarding several topics concerning environmental matters. An individual score for each respondent was calculated

by summing all 15 NEP items. Considering the whole sample, the average NEP score was 56.78, which indicates that, overall, Portuguese consumers are somewhat conscious of environmental problems and concerned with the environment, nevertheless, are not entirely sensitive to matters of the environment, otherwise the score would be higher (Zhushi-Etemi et al., 2021). To further examine the respondents' ecological overviews, Table 4.2 discriminates the data collected from the NEP scale with respect to all of its items presenting mean scores and response frequency.

Table 4.2

Descriptive statistics and distribution of response frequency (%) for the NEP scale

Items	Descriptive statistics		Response frequency (%)				
	M ³	SD ⁴	Strongly Disagree	Disagree	Indifferent	Agree	Strongly Agree
NEP1	3.5	1.28	9,4%	18,6%	6,4%	43,6%	22%
NEP2*	3.68	1.27	31,2%	37,8%	4,6%	20,2%	6,2%
NEP3	4.48	0.82	1,4%	3%	3,8%	29,4%	62,4%
NEP4*	2.95	1.18	9%	32,6%	10%	40,8%	7,6%
NEP5	4.5	0.87	2,4%	2,6%	3,4%	25,6%	66%
NEP6*	2.01	1	3,6%	7,4%	7,4%	50%	31,6%
NEP7	4.58	0.78	1,2%	2%	4,8%	21,4%	70,6%
NEP8*	3.71	1.32	36%	31,2%	8,8%	15,8%	8,2%
NEP9	4.48	0.77	0,8%	2,6%	4,4%	31,8%	60,4%
NEP10*	3.65	1.3	33,6%	30,8%	9,4%	19,6%	6,6%
NEP11	3.82	1.15	5,4%	11,2%	10,4%	42%	31%
NEP12*	3.87	1.25	42,6%	27%	10,2%	15,2%	5%
NEP13	4.04	1.02	2,6%	9%	7,4%	43,2%	37,8%
NEP14*	3.19	1.26	16,8%	32%	10,6%	33,6%	7%
NEP15	4.31	0.91	2%	4,2%	6,2%	35,8%	51,8%

* These statements were reverse scored. Agreement with these statements does not go in line with a pro-environmental orientation.

³ Mean

⁴ Standard deviation

Firstly, when comparing the item's standard deviations, it is possible to extrapolate that, respecting items 3, 5, 7, and 9, consumers' views on those topics are fairly more alike than those concerning the other statements (Ntanos et al., 2019). To perform an in-depth analysis of each item of the NEP scale, one must first understand the message underlying each one of them (see Appendix). Regarding item 1, a mean score of 3.5 suggests that respondents are, to a certain extent, concerned with the problems of overpopulation, with more than half of respondents agreeing with that statement. With almost 70% of respondents disagreeing (and strongly disagreeing) with item 2, it can be stated that the majority of respondents feel that humans do not have the right to modify the environment for the sake of satisfying their needs, which is congruent with a pro-environmental orientation. A mean score of 4.48 in statement n°3 entails that respondents are highly aware of the devastating consequences of their actions. Concerning items 4 and 14, there seems to be no general consensus about believing that humans will not make the earth unlivable and be able to control nature. Moreover, regarding both items 5,7, 9, and 12, the mean score and distribution of responses appoint to a unanimous opinion regarding the severe impact of the actions of humans on the environment and support the point of view that humans are not superior to plants or animals and are still subject to the laws of nature. A mean score of 2.01 for item 6 and 3.82 for item 11 reflects respondents' view that, although the earth has limited resources, humans can eventually learn how to develop them. Mean scores of items 8 and 13 suggest that most respondents acknowledge the fragility of the environment and believe that the balance of nature is easily disturbed and, therefore, it is not able to manage the impacts of industrialisation. Lastly, mean scores and response frequency regarding items 10 and 15 indicate that more than half of respondents recognize that, if production and consumption habits do not change, the world will be on the verge of an ecological crisis. In sum, data gathered from the NEP scale points out the fact that, despite the majority of respondents being in agreement with a pro-environmental view, there is no general endorsement of these ideas, meaning that there is no unified ecological viewpoint, otherwise the items' mean scores would be closer to five.

A part of the analysis concerning data collected from the NEP scale consisted of examining a possible relationship between respondents' individual NEP scores and some demographic characteristics such as gender, year of birth, and region of residence. A correlational analysis was conducted, and the coefficients obtained are presented in Table 4.3.

Table 4.3

Regression coefficients (dependent variable: NEP score)

Variables	Coefficients		p-value
	β	Std. error	
Gender			
Masculine	-2.080	0.712	0.004*
Year of birth			
Baby Boomers	-1.793	1.098	0.103
Generation Y	-1.583	0.769	0.040*
Region of residence			
North	-2.558	1.223	0.037*
Center	-1.188	1.216	0.329
Lisbon Metropolitan Area	-1.471	1.212	0.226
Algarve	-1.145	1.299	0.379
Model fit (F-value)		2.630	
Prob > F		0.011	
R-squared		0.036	
Adjusted R-squared		0.022	

* Significant at $\alpha = 0.05$

Regarding the variable “Gender”, the coefficient obtained was found to be statistically significant ($p\text{-value} < 0.05$) and indicates that, on average, men express a lower concern for the environment with individual NEP score decreasing 2.08 points when the respondent is a male relative to a female, keeping everything else constant. These findings are consistent with those obtained by Rideout et al. (2005), Casey and Scott (2006), Kalantari et al. (2007), and Wu et al. (2021).

With respect to the variable “Year of Birth”, only the coefficient for “Generation Y” was statistically significant ($p\text{-value} < 0.05$). Given that the reference category is “Generation X”, the value given by the coefficient implies that, relative to this generation, the individual NEP score of respondents from “Generation Y” is, on average, lower by 1.583 points, keeping everything else constant. This finding does not match with what the majority of the research evidence has established regarding the idea that the NEP scale is negatively

correlated with age and younger generations tend to be more environmentally conscious (Dunlap et al., 2000; Anvar & Venter, 2014; Kanchanapibul et al., 2014; Kuchinka et al., 2018; Reyna et al., 2018).

For the demographic variable “Region of residence”, solely the coefficient associated with the region “North” was shown to be statistically significant (p -value <0.05). The interpretation of the coefficient takes into consideration that the omitted category is the region of Alentejo and its value suggests that the average individual NEP score decreases by 2.558 points when the respondent is from the North, in comparison to when it is from the region of Alentejo, keeping everything else constant. This is consistent with evidence found by Ntanos et al. (2019), in which NEP scores were higher in rural than in urban areas of residence. This can be explained by the fact that people who live in rural areas are closer to nature and, therefore, are more appreciative and concerned with the protection of the environment and more aware of how fragile nature is.

Regarding the third section of the questionnaire, which included a DCE, the main analysis comprised the estimation of the WTP for a green product, followed by studying possible differences in WTP estimates between respondents relative to their year of birth, region of residence, the total number of people living in the household, annual household income, and individual NEP score (already revised earlier).

In order to estimate the coefficients associated with each attribute-level (as represented in equation 3.3) and the coefficients that reflect the interactions between each of the product attributes and the variables mentioned in the previous paragraph, one must first analyse if the data collected was to be treated separately or all together. Recalling what was mentioned in chapter 3.4, in the DCE, the BWS method was applied to extract more information from respondents by asking them to choose both their most and least preferred alternative from each choice set. From the data gathered from these two questions, it was possible to construct two models with the same formulation of the utility function, but one reflected the choice of the best alternative (defined as the “MOST” model), and the other of the worst alternative (defined as the “LEAST” model). Each of the models contained 6.000 observations given that each of the 500 respondents was presented with 12 choice sets. By estimating the two models separately, if, regarding the same product attribute, the coefficients obtained were statistically distinct from each other this would indicate that the decision-making process carried out by respondents to choose their least and most preferred option was different and, therefore, the analysis had to be conducted separately. Nonetheless,

if the coefficients were statistically the same, the analysis of the results could be done considering all observations.

When estimating the MNL model for both samples (the “MOST” and “LEAST”), the coefficients obtained were statistically (and significantly) different. Considering this, it was decided that the analysis was going to fall over the data collected from the “MOST” model since this is the standard model (the traditional DCE only includes one question about the most preferred alternative). Also, from the number of observations available with just the “MOST” model, it was possible to draw valuable insights.

With the intention to, apart from studying how each attribute-level influences the utility of an alternative, investigate the existence of any heterogeneities among respondents regarding the attributes’ coefficients, interactions between the product attributes and the variables “Year of birth”, “Region of residence”, “Number of people in the household”, “Yearly household income”, and “NEP_score” were defined. Keeping that in mind, the results from the estimation of the MNL model applied to the data containing the choice of the most preferred option are presented in Table 4.5 (see attachment). As can be seen from this table, only a few of the coefficients obtained were found to be statistically significant ($p\text{-value} < 0.05$). For that reason, and in order to obtain a much more refined model, only the main effects and interactions that were shown to be statistically significant were incorporated into the final estimation model. For the included demographic variables, every interaction between them and each of the attributes was individually tested to understand if they should be included as a whole (i.e., considering all of their categories) or not included at all in the final model. For example, concerning the interaction between the variables “Outside option” (which represents the option to not buy any of the alternatives) and “Yearly household income”, solely the coefficient for the category “Less than 5.000€” was shown to be statistically significant ($p\text{-value} < 0.05$) (see Table 4.5 in attachment). For that reason, a joint test with all interactions was performed. Given that the joint t-test retrieved a p-value lower than 0.05, it was decided that all interactions between these variables would be included in the final model. This same procedure was conducted to every interaction in which the coefficients were shown to be statistically significant in, at least, one of the categories ($p\text{-value} < 0.05$) (see Table 4.6 in attachment).

After defining the final model, the estimation of the coefficients referencing each of the attributes and its interactions with the previously mentioned variables proceeded. The results are presented in Table 4.4 below.

Table 4.4
Estimation results: MNL coefficients

Variables	Coefficients		
	β	Std. error	p-value
Outside Option			
Outside option	1.819	0.162	0.000*
Year of birth			
Generation X	-0.417	0.095	0.000*
Generation Y	-0.529	0.097	0.000*
Yearly household income			
Less than 5.000€	-1.197	0.305	0.000*
5.000€-10.000€	0.181	0.186	0.330
13.500€-19.000€	-0.281	0.161	0.080
19.000€-32.500€	0.296	0.151	0.051
More than 32.500€	0.134	0.173	0.439
NEP_score	0.106	0.011	0.000*
Price			
Price	-0.281	0.015	0.000*
NEP_score	-0.006	0.002	0.001*
Cleaning Efficiency			
Efficient	1.710	0.132	0.000*
Region of residence			
North	-0.177	0.102	0.084
Center	-0.018	0.102	0.858
Lisbon Metropolitan Area	-0.315	0.102	0.002*
Algarve	-0.016	0.109	0.882
Yearly household income			
Less than 5.000€	-0.616	0.197	0.002*

	5.000€-10.000€	0.025	0.161	0.876
	13.500€-19.000€	-0.094	0.132	0.475
	19.000€-32.500€	-0.007	0.128	0.956
	More than 32.500€	0.262	0.145	0.071
NEP_score		0.017	0.006	0.003*
Shine				
Leaves shine		0.512	0.101	0.000*
Yearly household income				
	Less than 5.000€	-0.028	0.178	0.875
	5.000€-10.000€	-0.320	0.140	0.022*
	13.500€-19.000€	-0.104	0.115	0.367
	19.000€-32.500€	0.012	0.111	0.913
	More than 32.500€	-0.053	0.125	0.670
NEP_score		0.021	0.006	0.000*
Eco-friendly				
Eco-friendly		1.406	0.047	0.000*
NEP_score		0.061	0.005	0.000*
Delicacy to the skin				
NEP_score		0.020	0.005	0.000*
Ease of use				
Easy to use		0.655	0.054	0.000*
NEP_score		0.023	0.006	0.000*

* Significant at $\alpha = 0.05$

Primarily, it is important to highlight that, for all attributes included, the interactions with the variable “NEP_score” were found to be statistically significant (p -value <0.05). Hence, it can be concluded that the NEP score can help explain the heterogeneities found in the valuation of the attributes and the respondents’ underlying preferences.

Regarding the interpretation of the coefficients, it can be stated that the coefficient for the variable capturing the option to not buy any of the alternatives (“Outside option”) was shown to be statistically significant ($p\text{-value} < 0.05$). Concerning this variable, the interpretation of the coefficient is made with regards to the utility of choosing to not buy any of the products presented. Considering this and, given that the respondent can either choose to buy or not buy, if the utility of a certain product is higher (lower) than the utility retrieved from choosing the “Outside option”, the probability that the respondent will choose to buy that product is above (below) 50 percent. For that reason, since the coefficient for this variable had a positive sign, it can be presumed that relative to buying none of the alternatives, the probability of buying the product is lower than 50 percent (respecting individuals which take in the baseline demographic characteristics, meaning individuals a part of the “Baby Boomers” generation and whose total yearly household income takes a value between 10.000€ and 13.500€, and the defined baseline for the “NEP_score” variable which is the median value of 57).

By looking at the coefficients for the interaction between the variable “Outside option” and the demographic variable “Year of birth” (which was apportioned to form 3 generations), it can be concluded that younger respondents, namely from generations X and Y, are more prone not to choose the outside option and select to buy, at least, one of the alternatives presented (relative to respondents who are part of the “Baby Boomers” generation, which is the reference category). Regarding the interaction with the variable “NEP_score”, a positive coefficient suggests that keeping everything else constant, the higher the individual NEP score, the more likely and frequent respondents have replied that they would not buy any of the alternatives presented (i.e., selected the “Outside option”).

Concerning the attribute “price”, the coefficient covering the main effect of this attribute was found to be statistically significant ($p\text{-value} < 0.05$) and had a negative sign, as one would have expected. Keeping everything else constant, the higher the price, the lower the utility an individual retrieves from an alternative. Moreover, a negative coefficient for the interaction between the attribute “price” and the variable “NEP_score” suggests that, as respondents’ individual NEP score increases, the effect/influence of price on the utility function increases (in absolute terms). In other words, as consumers become increasingly concerned with the environment (as captured by the NEP score), their level of sensitivity to price changes increases.

Moreover, when analysing the data, since the attributes “cleaning efficiency”, “brand”, “fragrance”, “shine”, “eco-friendly”, “delicacy to the skin”, and “ease of use” had only two levels, it was established that they would take the values 0 (in reference to the omitted attribute-level) and 1, hence, interpretations of these coefficients are to be made relative to the omitted attribute-level. Therefore, the estimated coefficient for the attribute “eco-friendly” can be interpreted such that, keeping everything else constant, relative to a non-green alternative, when the product is environmentally sustainable utility increases by 1.406 units. This indicates that consumers, when confronted with both a green and non-green alternative, will most probably prefer the former, thus, meaning that they value a product more positively (in terms of the level of utility they can retrieve from it) when it is eco-friendly. Coefficients regarding the interaction between the green attribute and the demographic variables were found to be statistically insignificant ($p\text{-value} > 0.05$) so it was not possible to draw any conclusions about differences in the green product valuation and WTP estimates among respondents. Additionally, a positive coefficient for the interaction between the attribute “eco-friendly” and the variable “NEP_score” implies that, as the NEP score increases, the higher the effect on utility when the product is eco-friendly. That is, consumers who exhibit a pro-environmental attitude tend to value more products that are green, concerning the utility that can be associated with it. This goes in line with the conclusions drawn by Kanchanapibul et al. (2014).

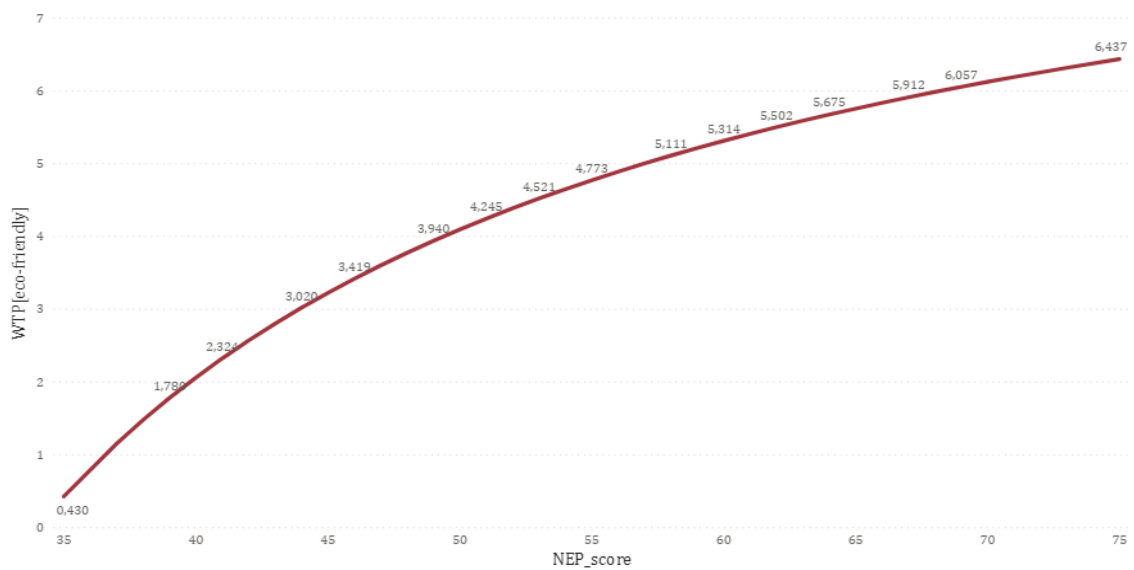
Since it was possible to conclude that Portuguese consumers value positively the “green” attribute, it became relevant to gather a measure to understand how much Portuguese consumers prefer an eco-friendly alternative over a non-green one, in terms of their willingness to pay for a green product (versus its non-green alternative). Therefore, following the estimation of the coefficients, and considering the main goal of the present study, the respondents’ willingness to pay for the attribute “eco-friendly” was calculated. Given the results obtained from the model estimation, equation 3.8 can be represented as follows:

$$WTP_{\text{Eco-friendly}} = - \left(\frac{\beta_{\text{Eco-friendly}} + \beta_{\text{Eco-friendly}\#\text{NEP_score}} \times \text{NEP_score}}{\beta_{\text{Price}} + \beta_{\text{Price}\#\text{NEP_score}} \times \text{NEP_score}} \right) \quad (3.9)$$

As the WTP estimates are normalized by the coefficient of the attribute price and its interaction with the variable “NEP_score”, their interpretations are made in euros.

Regarding the attribute “eco-friendly”, it is possible to conclude that, on average, consumers are willing to pay 4.8 euros more for a certain product to be environmentally sustainable. The fact that respondents are willing to pay that amount for a green product shows that Portuguese consumers are willing to put in the effort (in terms of economic expenditure) to change to more sustainable purchasing behaviors. Likewise, when analysing the interaction with the variable “NEP_score”, it was possible to observe that, as the individual NEP score increased, the respondents’ willingness to pay more for a green product also rose. This finding is consistent with the works of Ndebele and Marsh (2014) and Ntanos et al. (2019). Figure 4.1 below represents the distribution of the WTP estimates regarding the green attribute by the value of the NEP score.

Figure 4.1
WTP [Eco-friendly] by NEP_score



Source: Author’s own elaboration

5. Final Considerations

In the following chapter, a presentation of the managerial implications that one can retrieve from the results obtained is provided. Likewise, the main limitations that the study posits are stated as well as suggestions for further research on the topic.

5.1. Managerial Implications

The present dissertation contributes to the body of literature on sustainable consumption behavior while also developing useful managerial insights for companies when designing their business strategies. The study's findings can be translated into strategic guidelines for companies aiming to drive consumers' green purchasing behavior.

With regards to the average NEP score, it is fair to say that, despite being higher than 45 which is the middle point, it is still a relatively low score. For consumers to feel more motivated to buy green products, they must become more conscious of the environmental impacts of their actions and, alongside this, increasingly sensitive to environmental issues. Keeping this in mind, companies can launch awareness campaigns to inform consumers about the environmental problems that the world is facing today to lead them to rethink their consumption and purchasing habits.

From the analysis of the DCE and by looking at the estimated coefficients, one was able to grasp an idea of how Portuguese consumers view each of the product attributes presented. Additionally, from this analysis, retail companies can share a better understanding of how they can motivate consumers to purchase green products. The fact that the coefficient for the attribute "eco-friendly" had a positive sign indicates that, apart from being concerned with the environment and portraying a pro-environmental attitude, Portuguese consumers value positively an eco-friendly product (in the sense of the level of utility they can retrieve from it). Therefore, with the intention to promote the purchase of environmentally sustainable products, companies in the grocery retail sector can pursue value-differentiation strategies, focused on properly disclosing to consumers the benefits of green products and how they contribute to the preservation of the environment. Likewise, this strategic move can also increase consumers' willingness to pay for green products. By educating consumers and developing a strong product image around its concrete positive contributions to the environment, they may value and feel more enticed to purchase green products since they are able to clearly understand how their purchase can help protect the

environment. One effective way to do this is by having a salesperson in-store closely detailing this information to consumers and promoting this type of product.

Investigating the existence of heterogeneities among respondents allowed to define the consumer groups that companies may desire to target their strategies. For example, from the analysis of the data collected from the NEP scale, it was possible to infer that people from the region of Alentejo (relative to people from Porto) are more sensitive to environmental issues and individuals from generation X are more concerned with the environment than consumers from generation Y. Furthermore, from the DCE, findings suggested that consumers who scored higher on the NEP scale value more green product attributes and are willing to pay a higher price for such products. Considering this, companies can target their awareness campaigns to the consumer groups that are less environmentally conscious or design their advertising strategies promoting the purchase of green products to target consumers that most value this type of product and, therefore, are willing to pay more to acquire them.

On a final note, the fact that Portuguese consumers are, on average, willing to pay a considerably higher price to purchase a green product showcases that, not only are they concerned with the protection of the environment, but indeed are willing to put their money where their mouth is. From the results presented, no evidence points out a possible attitude-intention-behavior gap given that, overall, respondents have demonstrated to have a pro-environmental attitude, value positively a product that is eco-friendly, and be willing to pay a higher price for a greener alternative. This sheds a very positive light onto the future with consumers ready to take on the steps to change to more environmentally sustainable lifestyles.

5.2. Limitations and Further Research

Firstly, given that the questionnaire was only targeted to Portuguese consumers from the age of 25 to 65 who are the main or one of the decision makers regarding grocery shopping, this study's research findings are restricted to that consumer segment and cannot be generalised to the entire population. Moreover, replicating this study in other countries would allow eliminating any contextual factors possibly influencing the results as well as enable comparison between countries. It would be interesting to see if, for example, regarding the previously mentioned consumer segment, Portuguese consumers value less

green product attributes or are less environmentally conscious than other consumers from different countries.

Moreover, since the present work solely focuses on studying consumers' green purchasing behavior regarding the grocery retail sector and the DCE was designed in reference to a specific cleaning product (i.e., a dish detergent), the results obtained are to be interpreted merely for these specific contexts. For that reason, conducting this study in relation to other products and economic sectors (e.g., the mobility sector and consumers' willingness to pay more for an electric vehicle) would be relevant to evaluate if the conclusions taken from this study can somehow be transposed into other circumstances. Notwithstanding, the decision to study the grocery retail sector and have the dish detergent as the reference product in the DCE was thoroughly explained in sections 2.3.1 and 3.2, and necessary to narrow the focus of the present work and allow detailed conclusions to be drawn from the analysis of the results obtained.

Regarding the environmental attitudes measurement scale used in the study and when resorting to a Likert scale as a format response to the statements presented, one must bear in mind an important aspect. Even though a scale from 1 to 5 with their respective reference meanings is established, respondents unintentionally betake on an unobservable internal scale, in which the numbers on the scale can mean different things for different individuals. Consequently, using a Likert scale does not enable to fully capture these underlying thoughts and the true opinions of respondents on the matters, with all being summed up to a scale from “strongly disagree” to “strongly agree”, which may seem oversimplified. A more in-depth analysis of consumers' environmental attitudes would include the possibility of respondents elaborating their views on the different topics.

Concerning the CBC analysis, existing research suggests that the price attribute tends to influence consumers' decisions more deeply when respondents are confronted with a choice task in a DCE setting than in real market situations. This occurs because, in the DCE, alternatives are presented side by side and the price attribute is more visible, hence, allowing a more direct comparison between the alternatives and, consequently, more attention is perhaps given to this attribute (Ben-Akiva et al., 2019). However, in the case of the present study, only stated preference data was employed and, therefore, it was not possible to establish such a hypothesis. Moreover, previous literature on the topic of green behavior has asserted that data from self-report questionnaires is not an entirely reliable predictor of actual behavior, thus, it would be relevant to combine the data collected with data capturing real

market behavior (i.e., revealed preference data) (Milfont & Duckitt, 2010). This would allow validating the model applied by assessing if hypothetical choice decisions made within the DCE context are reflected ultimately in real market purchasing behavior (i.e., if the different product attributes influence actual buying decisions in the same magnitude as estimated by the model) (Ben-Akiva et al., 2019).

Another important aspect to consider relates to the fact that, in the present work, simply a main effect analysis of the defined attributes was conducted. As explained in chapter 3.4, when a researcher decides to merely carry out a main effect analysis, one should not interpret this as an indication that interaction effects between two or more variables are non-existent or non-significant. If indeed omitted interaction effects are significant, the coefficients obtained from the main effect analysis will be biased, inducing misleading results (Louviere et al., 2000). Therefore, further research on the topic should study the possibility of the existence of interaction effects to deepen the analysis performed in this study. Looking at the attributes included in the DCE, additional research could investigate, for example, a potentially significant two-way interaction effect between the attributes “price” and “eco-friendly” to examine if consumers are less sensitive to price when the product is environmentally sustainable.

With respect to the utility function underlying each alternative, it is important to stress the existence of unobservable factors that can affect consumers’ decision process, though were not captured by the model. The model that was defined in the study did not take into consideration what the literature calls context effects such as the influence of social pressure. As highlighted in chapter 2.3.2, consumers’ green purchase intention can be intensified by pressure exerted by the network one is inserted. Many times, consumers feel enticed to buy green products because they think that, by doing so, they will be well perceived by society (Vermeir & Verbeke, 2006; Lu et al., 2013). By adding an effect variable in the utility function, one would be able to account for the effects of social (or peer) pressure on consumers’ purchasing decisions and better represent their decision-making process, hence, obtaining more accurate consumer data (Ben-Akiva et al., 2012). Nevertheless, in this study, the analysis was kept simple given that defining the effect variable and establishing the strength of the influence of social pressure is not straightforward and demands more complex data to be collected such as the percentage of people within the respondent’s network that buys green products.

When conducting the analysis of the data collected and considering that only data from the “MOST” model (answers given by respondents concerning the most preferred alternative) was considered, it would be relevant to include separately the analysis of the data from the “LEAST” model as well. By doing so, it would be possible to fully take advantage of the data collected and add more insights to the study.

Lastly, concerning the ordering of the attitudinal and DCE questions when constructing the questionnaire, existing literature appoints that surveying questions about environmental attitudes before the choice tasks can affect the answers given by respondents (Mariel et al., 2021). The underlying idea is that attitudinal questions, when displayed before the DCE questions, can increase respondents’ sensitivity towards the green product attribute, hence, making it more likely that they will choose the sustainable alternative as the preferred one. Therefore, in order to test if directional context effects were a conditioning factor for this study, before conducting the full collection of data and making the questionnaire available to all respondents, it would be relevant to conduct two pilot tests with different questionnaire formats (where attitudinal questions are presented before and after the DCE questions) targeting a portion of the total sample size (Liebe et al., 2016). Nonetheless, due to time and cost constraints, this analysis was not performed for the present work.

6. Conclusion

More than ever before, the world is witnessing today the devastating consequences of human activity on the environment. Without precedent, the unsustainable patterns of production and consumption are damaging the condition of the soils, killing animals and plants, aggravating climate change and forest degradation, and much more. In that regard, environmental activists are calling out companies, Governments, and consumers and urging them to change their production and consumption habits.

Apart from carrying out sustainable initiatives throughout their day-to-day operations such as the use of renewable energy, companies take on the important role of motivating consumers to buy green products. Indeed, consumers can contribute massively to protecting the environment by adopting more sustainable lifestyles through, for example, recycling and purchasing more eco-friendly products.

The present dissertation contributes to the body of literature on the topic of green purchasing behavior, specifically, regarding the purchase of environmentally sustainable products in the grocery retail sector. Concerning this economic sector, given the increasing demand for eco-friendly products, more and more green products are becoming available, and consumers are especially sensitive to environmental issues when it comes to grocery products (Mostaghel & Chirumalla, 2021). The study was conducted particularly for the Portuguese consumer market, allowing to cover a research gap in the existing literature.

Through a questionnaire containing questions of an environmental attitudes measurement scale and several hypothetic choice scenarios, the study focused mainly on answering four research questions.

Firstly, the analysis of the data collected from the NEP scale, a widely used scale designed to measure respondents' attitudes towards the environment returned an overall mean NEP score higher than the middle point between a pro-ecological and anti-ecological viewpoint, nevertheless relatively low (when considering the upper end of the scale). Therefore, this means that Portuguese consumers are to a certain extent concerned with the environment but there is no strong agreement on a pro-environmental perspective on the topics discussed. Moreover, research has found that consumers who scored higher on the NEP scale and, therefore, exhibit a deeper concern for the environment tend to be more sensitive to price changes. In other words, for this type of consumer, in general, price increases of green products (for example) can affect their purchases.

Secondly, when studying the data gathered from the DCE and the numerous choice scenarios presented to respondents, it was revealed that Portuguese consumers value positively a green product attribute in the sense of the utility they can retrieve from a given alternative. In other words, keeping every other product attribute constant, when comparing both a green and a non-green option, the former is associated with a greater utility, thus, being the preferred choice. Ultimately, this means that respondents have reflected their concerns and intentions of protecting the environment in their choices.

Regarding the third research question, the study's findings have indicated that, on average, Portuguese consumers are willing to pay 4.8 euros more to purchase a green product (relative to its non-green version).

Additionally, statistically significant research evidence has established that consumers who are more deeply concerned with the protection of the environment tend to value more green products and are willing to pay a higher price for an eco-friendly product than consumers who are less environmentally conscious.

The study's findings allowed valuable insights to be drawn, especially for companies aiming to drive consumers to purchase more green products. As already emphasized, in order to motivate consumers to buy environmentally sustainable products, companies should, first, launch advertising and informational campaigns to increase the level of sensitivity of Portuguese consumers towards different environmental issues and make them realise how their purchase decisions can help to protect the environment. Following this, the fact that Portuguese consumers are, on average, willing to pay up to 4.8 euros more to acquire a green product (relative to a non-green alternative) shows that they are committed to becoming "greener". This estimate also provides crucial information for companies when establishing the prices of green products. From the evidence gathered, there is no indication of a possible attitude-intention-behavior gap, conveying the idea that consumers are, not only concerned with the environment but also ready to pay the higher price to change to more sustainable purchasing and consumption habits. All in all, findings from the present study shed a positive light on the future since, with consumers deeply altering their purchasing habits and companies reforming their business strategies, Portuguese consumers and retailers can contribute to ensuring that future generations can experience the same living standards as today's generations and prevent the current state of planet Earth of becoming even more deteriorated.

Appendix- NEP scale composition

Items	Do you agree or disagree that:
NEP1	We are approaching the limit of the number of people the earth can support.
NEP2	Humans have the right to modify the natural environment to suit their needs.
NEP3	When humans interfere with nature it often produces disastrous consequences.
NEP4	Human ingenuity will ensure that we do not make the earth unlivable.
NEP5	Humans are severely abusing the environment.
NEP6	The earth has plenty of natural resources if we just learn how to develop them.
NEP7	Plants and animals have as much right as humans to exist.
NEP8	The balance of nature is strong enough to cope with the impacts of modern industrial nations.
NEP9	Despite our special abilities, humans are still subject to the laws of nature.
NEP10	The so-called, “ecological crisis” facing humankind has been greatly exaggerated.
NEP11	The earth is like a spaceship with very limited room and resources.
NEP12	Humans were meant to rule over the rest of nature.
NEP13	The balance of nature is very delicate and easily upset.
NEP14	Humans will eventually learn enough about how nature works to be able to control it.
NEP15	If things continue on their present course, we will soon experience a major ecological catastrophe.

Source: Dunlap et al. (2000)

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Attachments

Table 4.5

Estimation results (with all interaction effects): MNL coefficients

Variables	Coefficients		
	β	Std. error	p-value
Outside Option			
Outside option	2.838	0.475	0.000*
Year of birth			
Generation X	-0.807	0.303	0.008*
Generation Y	-1.045	0.301	0.001*
Region of residence			
North	-0.291	0.326	0.372
Center	-0.222	0.326	0.496
Lisbon Metropolitan Area	-0.209	0.319	0.513
Algarve	-0.202	0.349	0.563
Number of people in the household			
2	-0.161	0.319	0.614
3	-0.216	0.317	0.495
4	-0.256	0.344	0.454
5 or more	-0.587	0.443	0.185
Yearly household income			
Less than 5.000€	-1.815	0.492	0.000*
5.000€-10.000€	-0.360	0.350	0.304
13.500€-19.000€	-0.539	0.310	0.081
19.000€-32.500€	0.223	0.303	0.462
More than 32.500€	-0.246	0.335	0.463
NEP_score	0.089	0.012	0.000*

Price

Price		-0.267	0.081	0.001*
Year of birth				
	Generation X	-0.039	0.052	0.456
	Generation Y	0.011	0.051	0.824
Region of residence				
	North	-0.052	0.061	0.394
	Center	0.103	0.059	0.079
	Lisbon Metropolitan Area	0.107	0.058	0.066
	Algarve	0.117	0.062	0.061
Number of people in the household				
	2	-0.053	0.052	0.307
	3	-0.003	0.053	0.947
	4	0.030	0.057	0.594
	5 or more	0.032	0.073	0.660
Yearly household income				
	Less than 5.000€	0.045	0.076	0.552
	5.000€-10.000€	0.006	0.062	0.922
	13.500€-19.000€	-0.045	0.052	0.383
	19.000€-32.500€	-0.090	0.051	0.078
	More than 32.500€	-0.120	0.061	0.051
NEP_score		-0.005	0.002	0.006*
Cleaning Efficiency				
Efficient		2.205	0.298	0.000*
Year of birth				
	Generation X	-0.218	0.185	0.238
	Generation Y	-0.262	0.180	0.146
Region of residence				
	North	-0.446	0.233	0.056
	Center	-0.541	0.229	0.018*

	Lisbon Metropolitan Area	-0.810	0.223	0.000*
	Algarve	-0.441	0.242	0.069
Number of people in the household				
	2	0.230	0.175	0.188
	3	0.373	0.171	0.029*
	4	0.311	0.190	0.101
	5 or more	0.095	0.228	0.677
Yearly household income				
	Less than 5.000€	-0.631	0.228	0.006*
	5.000€-10.000€	0.014	0.210	0.948
	13.500€-19.000€	-0.158	0.177	0.373
	19.000€-32.500€	-0.059	0.178	0.738
	More than 32.500€	0.482	0.227	0.034*
NEP_score				
		0.020	0.007	0.005*
Brand				
Exclusive brand				
		-0.189	0.287	0.510
Year of birth				
	Generation X	0.012	0.184	0.949
	Generation Y	-0.008	0.180	0.966
Region of residence				
	North	0.208	0.211	0.324
	Center	0.047	0.208	0.822
	Lisbon Metropolitan Area	0.123	0.202	0.543
	Algarve	-0.024	0.222	0.914
Number of people in the household				
	2	0.000	0.183	1.000
	3	-0.168	0.181	0.353
	4	-0.288	0.198	0.146

	5 or more	0.069	0.249	0.782
Yearly household income				
	Less than 5.000€	-0.147	0.250	0.555
	5.000€-10.000€	-0.127	0.209	0.543
	13.500€-19.000€	0.018	0.185	0.924
	19.000€-32.500€	0.076	0.184	0.677
	More than 32.500€	-0.202	0.219	0.355
NEP_score		-0.006	0.007	0.402
Fragrance				
With fragrance		0.047	0.284	0.870
Year of birth				
	Generation X	0.138	0.183	0.453
	Generation Y	-0.085	0.180	0.637
Region of residence				
	North	0.305	0.205	0.137
	Center	0.118	0.203	0.561
	Lisbon Metropolitan Area	0.207	0.198	0.294
	Algarve	0.026	0.215	0.903
Number of people in the household				
	2	0.023	0.182	0.898
	3	0.013	0.180	0.944
	4	-0.262	0.196	0.182
	5 or more	0.154	0.244	0.528
Yearly household income				
	Less than 5.000€	-0.380	0.250	0.128
	5.000€-10.000€	-0.361	0.202	0.075
	13.500€-19.000€	-0.278	0.179	0.121
	19.000€-32.500€	-0.044	0.179	0.804

	More than 32.500€	-0.120	0.204	0.557
NEP_score		-0.010	0.007	0.130
Shine				
Leaves shine		0.715	0.269	0.008*
Year of birth				
	Generation X	-0.208	0.174	0.232
	Generation Y	-0.264	0.170	0.120
Region of residence				
	North	0.117	0.196	0.549
	Center	0.237	0.190	0.214
	Lisbon Metropolitan Area	0.224	0.186	0.228
	Algarve	0.129	0.200	0.518
Number of people in the household				
	2	-0.226	0.172	0.190
	3	-0.084	0.171	0.623
	4	-0.082	0.184	0.655
	5 or more	-0.310	0.232	0.182
Yearly household income				
	Less than 5.000€	-0.025	0.230	0.914
	5.000€-10.000€	-0.495	0.193	0.010*
	13.500€-19.000€	-0.173	0.170	0.309
	19.000€-32.500€	0.043	0.171	0.803
	More than 32.500€	-0.301	0.200	0.132
NEP_score		0.016	0.006	0.018*
Eco-friendly				
Eco-friendly		1.371	0.263	0.000*
Year of birth				
	Generation X	-0.105	0.169	0.534

	Generation Y	-0.094	0.167	0.576
Region of residence				
	North	-0.104	0.198	0.598
	Center	-0.017	0.195	0.929
	Lisbon Metropolitan Area	-0.248	0.190	0.192
	Algarve	-0.084	0.206	0.683
Number of people in the household				
	2	0.183	0.169	0.278
	3	-0.021	0.168	0.902
	4	0.135	0.183	0.461
	5 or more	-0.002	0.232	0.992
Yearly household income				
	Less than 5.000€	-0.419	0.228	0.067
	5.000€-10.000€	0.033	0.198	0.868
	13.500€-19.000€	0.181	0.168	0.283
	19.000€-32.500€	0.166	0.165	0.316
	More than 32.500€	0.226	0.198	0.252
NEP_score				
		0.058	0.006	0.000*
Delicacy to the skin				
Delicate				
		0.509	0.286	0.076
Year of birth				
	Generation X	0.096	0.181	0.596
	Generation Y	0.019	0.178	0.913
Region of residence				
	North	-0.236	0.214	0.271
	Center	-0.349	0.212	0.099
	Lisbon Metropolitan Area	-0.363	0.205	0.078
	Algarve	-0.116	0.225	0.607

Number of people in the household				
	2	0.103	0.178	0.564
	3	-0.127	0.176	0.470
	4	-0.035	0.193	0.855
	5 or more	-0.117	0.240	0.627
Yearly household income				
	Less than 5.000€	-0.449	0.246	0.069
	5.000€-10.000€	-0.190	0.206	0.356
	13.500€-19.000€	-0.261	0.181	0.149
	19.000€-32.500€	-0.124	0.180	0.491
	More than 32.500€	0.099	0.218	0.648
NEP_score		0.021	0.007	0.003*
Ease of use				
Easy to use		1.022	0.274	0.000*
Year of birth				
	Generation X	-0.131	0.178	0.460
	Generation Y	-0.296	0.174	0.088
Region of residence				
	North	0.047	0.198	0.811
	Center	0.118	0.194	0.542
	Lisbon Metropolitan Area	0.019	0.189	0.922
	Algarve	0.148	0.204	0.468
Number of people in the household				
	2	-0.261	0.176	0.138
	3	-0.318	0.175	0.069
	4	-0.300	0.188	0.111
	5 or more	-0.097	0.237	0.682

Yearly household income				
	Less than 5.000€	-0.098	0.232	0.672
	5.000€-10.000€	-0.350	0.198	0.077
	13.500€-19.000€	-0.018	0.173	0.916
	19.000€-32.500€	0.115	0.174	0.511
	More than 32.500€	-0.223	0.203	0.273
NEP_score		0.014	0.007	0.032*

* Significant at $\alpha = 0.05$

Table 4.6
Joint tests

Interaction	Joint test	Decision
Outside Option * Yearly household income	0.000*	Include all interactions between the variable and every single category.
Cleaning Efficiency * Region of residence	0.002*	Include all interactions between the variable and every single category.
Cleaning Efficiency * Number of people in the household	0.222	Do not include this interaction.
Cleaning Efficiency * Yearly household income	0.001*	Include all interactions between the variable and every single category.

Shine * Yearly household income	0.026*	Include all interactions between the variable and every single category.
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* Significant at $\alpha = 0.05$