U.PORTO

FEUP FACULDADE DE ENGENHARIA UNIVERSIDADE DO PORTO

with the support of

mygreenapp

INTEGRATED MASTER'S IN ENVIRONMENTAL ENGINEERING

2020/2021

WILLINGNESS TO PAY FOR GREEN PREMIUMS THROUGH A SUSTAINABLE MARKETPLACE

FRANCISCO ARMANDO TEIXEIRA FERREIRA

Dissertation submitted for the degree of

Master On Environmental Engineering

Supervisor at the University:

Professor Doctor Mário Amorim Lopes

Department of Industrial Engineering and Management of the Faculty of Engineering at University of Porto

Supervisors at the company MyGreenApp:

Eng. Pedro Miguel Fernandes Teixeira, CEO at MyGreenApp

Eng. Bruno Alexandre Silva de Sousa, CTO at MyGreenApp

October 2021

ABSTRACT

The theme of this thesis is the assessment of willingness to pay (WTP) for sustainable products and services sold in a sustainable Marketplace. The main objectives were to find out how much people are willing to pay and how demographics, e-commerce habits, and eco-literacy can influence this factor.

The methodology used consisted of conducting an online survey, in two different languages, comprising responses mainly from Portugal, but also several continents and countries. Respondents' demographics, online shopping habits, and eco-literacy were evaluated. To assess willingness to pay, stated preference direct questions were used, through the Contingent Valuation Method, and the *Van Westendorp* Price Sensitivity Meter method (PSM). As case studies, the example of a sweater as a product and a transport of food home delivery as a service were applied. These examples were selected due to their representation as market trends and environmental impacts. Contingent Valuation was applied both to the product and the service, while PSM was only employed to the product. In addition, target groups were defined, through which the demography of respondents was manipulated, as to their age, gender, income, and their e-commerce and eco-literacy habits were also controlled, to understand the influence on WTP from the example product.

The main results consisted of a willingness to pay 25% more for the shirt, and 40% more for the service, consistent values for both questionnaires, and both methods. While Contingent Valuation was considered a direct measure for the product and service, PSM was used to obtain an optimal product price that maximizes the company's profit, and to obtain two economic points, the optimal price point, and the point of marginal expensiveness.

As for the target groups analysis, it was found that the female gender favors the sustainable product, as they seem to pay more, particularly for women aged over 25, with incomes above 30K €per year. Also, ages 25 and over, for both men and women, are willing to pay more than younger ages. Respondents with good e-commerce habits and good eco-literacy presented WTP results like the general ones, while the group of respondents with low e-commerce and low literacy showed mixed results.

The main conclusions that can be drawn from this study are that there is a predisposition to pay for sustainable products and services, and that socio-economic, demographic, e-commerce habits and eco-literacy parameters interfere in the WTP.

To obtain even more representative and adequate results, future studies should focus on covering a greater number of survey respondents, a geographic expansion, new products and services, and new methods that fit revealed preferences, and expected costs, to evaluate WTP.

Keywords: Willingness to Pay, Green Premium, Sustainable Marketplace, E-commerce, Eco-literacy, Demographics, Consumer Behavior

RESUMO

O tema desta tese está relacionado com a avaliação da predisposição para pagar (WTP – *Willingness to pay*) por produtos e serviços sustentáveis vendidos num *Marketplace* sustentável. Os principais objetivos foram descobrir quanto as pessoas estão dispostas a pagar e de que forma dados demográficos, hábitos de *e-commerce* e eco literacia podem influenciar esse fator.

A metodologia utilizada consistiu na realização de um inquérito online, em dois idiomas diferentes, com respostas maioritariamente de Portugal, mas também de vários continentes e países. Os dados demográficos dos entrevistados, os hábitos de compras online e a eco literacia foram avaliados. Para avaliar a predisposição a pagar, foram utilizadas questões diretas de preferência declarada, por meio de dois métodos: o método da *Contingent Valuation* (CV); e o método *Van Westendorp Price Sensitivity meter* (PSM). Como estudos de caso, foram aplicados o exemplo de uma camisola, enquanto produto, e de um transporte de entrega de comida ao domicílio, enquanto serviço. Estes exemplos foram selecionados por serem representados como tendências de mercado e de elevados impactos ambientais. O método da CV foi aplicado tanto ao produto quanto ao serviço, enquanto o método PSM foi empregue apenas ao produto. Além disso, foram definidos grupos-alvo, através dos quais se manipularam determinados parâmetros, desde a demografia dos inquiridos, quanto à sua idade, sexo, e rendimento, aos seus hábitos de e-commerce e eco literacia, para entender a influência na WTP do produto de exemplo.

Os principais resultados consistiram na predisposição de pagar 25% a mais pela camisola e 40% a mais pelo serviço, valores estes consistentes para ambos os questionários, e para ambos os métodos. Enquanto a CV foi considerada uma medida direta para o produto e serviço, o PSM foi usado para obter um preço de produto ótimo que maximiza o lucro da empresa e para obter dois pontos económicos, o ponto de preço ótimo e o ponto de custo marginal. Quanto à análise dos grupos-alvo, constatou-se que o género feminino privilegia o produto sustentável, pois parecem pagar mais, principalmente para as mulheres com mais de 25 anos, e se reajustar acima de 30 mil euros por ano. Além disso, as pessoas com 25 anos ou mais, tanto para homens quanto para mulheres, estão dispostas a pagar mais do que as idades mais jovens. Os inquiridos com bons hábitos de e-commerce e boa eco literacia apresentaram resultados de WTP semelhantes aos gerais, enquanto o grupo de inquiridos com baixo e-commerce e fraca literacia, apresentou resultados mistos.

As principais conclusões que podem ser retiradas deste estudo são que há uma predisposição para pagar por produtos e serviços sustentáveis vendidos num Marketplace, e que os parâmetros socioeconómicos, demográficos, de e-commerce, e de eco literacia, interferem na WTP. Para obter resultados ainda mais representativos e adequados, estudos futuros devem focar-se em cobrir um maior número de respostas no questionário, uma expansão geográfica do mesmo, novos produtos e serviços, e novos métodos que atendam às preferências reveladas e custos esperados, para avaliar a WTP.

Palavras-chave: Predisposição para pagar, *Green premium*, *Marketplace* Sustentável, E-commerce, Eco literacia, Demografia, Comportamento do Consumidor

Acknowledgments

This thesis represents the final examination of my journey at the Faculty of Engineering of the University of Porto. Without the support and guidance of the surrounding people in my life, it would not have been possible. Throughout the writing of this dissertation, I have received a great deal of support and assistance.

Firstly, I would like to thank my FEUP supervisor, Professor Mário Amorim Lopes, whose guidance was essential in formulating the research questions and methodology for this thesis. I would also like to acknowledge my company supervisors, from MyGreenApp, Engineer Pedro Teixeira, and Engineer Bruno Sousa, for their advice and assistance and for helping me shape my thesis project.

I am grateful that I got the opportunity to investigate sustainable and ethical markets, and willingness to pay, among MyGreenApp start-up aims. I extend my gratitude to all the Professors, collaborators, and colleagues, from FEUP, who sharpened my academic path, and gave me the tools to write this thesis.

Another word of appreciation to all the people who participated in my survey experience and allowed me to obtain the robust results that featured my dissertation.

Finally, and most importantly, I thank my friends and family, who always believed in my ability to succeed, and motivated me to work. To my parents, thank you for allowing me to study in a great university, and to my friends, thank you for your example, advice, and encouragement.

“Be the change you want to see in the world”
Mahatma Gandhi

CONTENTS

List of Figures

List of Tables

Acronyms

WTP – Willingness to Pay
B2B – Business-to-Business
B2C – Business-to-Consumer
e-commerce – Electronic Commerce
WHO – World Health Organization
CE –Circular Economy
GHG – Greenhouse Gases
PCF – Product Carbon Footprint
BDM – Becker-DeGroot-Marschak
CBC – Choice-based Conjoint
ICBC – Incentive Aligned Choice Based Conjoint
CV – Contingent Valuation
CP – Costumer Participation
PSM – Price Sensitivity Meter
OPP – Optimal Price Point
PMC – Point of Marginal Cheapness
IPP – Indifference Price Point
PME – Point of Marginal Expensiveness
GWP – Global Warming Potential
PET – Polyethylene terephthalate
MVP – Minimum Viable Product

1. Introduction

1.1. Motivation

Currently, in modern society, topics such as decarbonization, ethical and sustainable markets, and circular economy are gaining more interest and importance towards the development of a greener world. Furthermore, the arrival of the digital era makes for the coupling between the two crucial strands: the connection between people and sustainability. The world today is faced with climate change, pollution, and the destruction of natural ecosystems. One way to fight these threats to our planet and society is to achieve a zero-carbon footprint – balancing out man-made carbon dioxide emissions through reduction measures.

1.2. Objectives

The goal of this master thesis in environmental engineering is to define a strategy for launching and developing a sustainable marketplace that seeks to be the baseline for selling products and/or services, involving customers and retailers. The topic is approached with the development of a market study to investigate consumers' willingness to pay for products and services of ethical and sustainable companies.

If the willingness to pay is higher than the cost of the product or service, the company may place it on the market at a higher price, equivalent to the WTP range, with the monetary difference being translated into profit for each sales unit. This difference can be exploited by a sustainable Marketplace' company, as a commission that can be applied for each product or service sold by retailers present in the online market.

More precisely this thesis is developed in association with the company, *MyGreenApp*, to obtain representative willingness-to-pay range values, for two case studies, which represent not only the sustainable market interest but also its applicability in terms of rates and profit, as the company can charge an optimal price for the product or service, that ensures sustainability without compromising the company's financial viability. Thus, this strategy is based upon the measurement of the willingness to pay through a market survey.

For this study, the WTP is divided into three main research questions:

- Are people willing to pay more for green products and services? If so, how much?
- How much are customers willing to pay for sustainable products and services, sold in a sustainable marketplace?
- Are there statistically significant differences between people that willing to pay more for green products and those who are not?

In terms of the scope's research, this study is delimited to the e-commerce connected to B2C, i.e., business to consumer. Furthermore, the surveys conducted involve respondents from different parts of the world, but mainly from Portugal. Two surveys were developed, one in Portuguese and another in English. The demographic characteristics are studied, as well as socio-economic features, e-commerce habits, and eco-literacy, i.e., knowledge in the environmental area.

1.3. Presentation of the company "*MyGreenApp*"

As previously mentioned, the purpose of this thesis is to investigate the willingness to pay for sustainable products and services, through a sustainable online marketplace, developed in association with a start-up called *MyGreenApp*.

This is a start-up born in October 2019 with a collaboration between Portugal & Singapore. The founders of *MyGreenApp,* concerned with the increasing environmental problems, realized that calculating our carbon footprint is a particularly hard task without a proper tool to help us. As a next step, they intend to develop a mobile phone application (app) integrating a carbon footprint tracker, a sustainable and ethical marketplace, and a social media platform, all in one tool. Its main vision is to achieve a carbon-neutral footprint, helping people and associations to reduce their environmental impact through a simple and accessible tool that allows the user to monitor and offset his carbon footprint. By assembling a sustainable marketplace, a social network, and a tool to measure carbon footprints (CO_2 trackers), the company seeks to stand out in the market, presenting a step towards a more sustainable life.

In this context, they are creating a personalized sustainable digital advisor for a decarbonized lifestyle by tracking and offsetting the users' carbon footprint, through conscious alternative solutions in their surroundings or even suggesting volunteering events to conjugate consumers and planet needs. Additionally, the start-up seeks to act upon different economic sectors such as mobility, agri-food, commerce, industry and services, and buildings and energy consumption.

MyGreenApp will have as one of its main sources of revenue the establishment of a fee for each transaction made using the app. It will be necessary to define the right variables to understand how the company can make a profit. The app will also have an educational function by connecting CO_2 trackers to the social network.

1.4. Theoretical and Practical Contributions

This thesis contributes to science by the unification of e-commerce and the three dimensions of sustainability, through the evaluation of people's WTP among other characteristics, such as demographics, e-commerce habits, and eco-literacy. The study thus merges science with empirical data to create deeper knowledge and contribute to the body of literature regarding willingness to pay for sustainable products and services sold in a sustainable marketplace.

1.5. Synopsis

This document is organized into 5 main chapters. The current chapter provides the context, motivation, and states the objectives of the present work. The literature review (chapter 2) provides informational background, reviews and reports the state-of-the-art regarding ethical and sustainable online markets worldwide and in Portugal. In this step, it is crucial to identify the commercial sectors for which the study might be applicable. Furthermore, it is performed an analysis of the environmental impact of products and services considered equivalent for the consumer. This step aims to choose examples of products and services that can be considered comparable, in terms of their environmental impacts, for the assessment of willingness to pay. Chapter 3 presents the methodology followed in this study, with both theoretical and practical descriptions. Chapter 4 presents the empirical data collected from the study, more precisely, the outcomes of the surveys performed, and analyses the results. In this chapter it is investigated and analyzed the added value that customers are willing to pay to consume more sustainably, thus with a lower environmental impact ("green premium"). More precisely, to conduct an online survey to test the premise: "In the context of MyGreenApp's "Sustainable Marketplace", what is the value that consumers would be willing to pay for more sustainable products and services?". By relating prices with environmental impacts of products and services, the willingness to pay results are explored in percentage and absolute values. Finally, in chapter 5 we draw the main conclusions reached in the study, as well as future perspectives.

2. Background

This chapter reports the current body of knowledge on e-commerce, marketplaces, sustainability, and circular economy, tendencies in sustainable markets, green premiums, and finally, willingness to pay.

2.1. Digital Economy

Society has been growing up and developing, thus increasingly exploiting our natural resources, to develop more industrial and consumer goods.

2.1.1. Industrial Goods

For the scope of this thesis, it is relevant to distinguish between two types of goods: intermediate and final consumer goods. While intermediate or industrial goods are used in the production of other goods, consumer goods are finished products that are sold to and used by consumers, like clothing, food, and drinks.[1]

Demand differs between both types of goods. Industrial ones are driven by derived or indirect demand. This demand arrives from the need to provide finished products to consumers. On the other hand, demand for consumer goods results from the direct usage of a good or service.

2.1.2. Consumer Goods

Consumer goods are those purchased by individuals and households rather than by manufacturers and industries. Firms producing these goods are usually in the food production, packaged goods, clothing, beverages, automobiles, or electronics sectors. Overall, they make and sell products that are intended for direct use by buyers. [2]

Many consumer goods companies are faced with a range of close competitors, substitute goods, and potential rivals. Competition on price and quality is often fierce, so marketing, advertising, brand differentiation, and technological trends are key considerations for a business strategy. [2]

Modern Internet technology has had an enormous and ongoing impact on the consumer goods sector. The ways products are manufactured, distributed, marketed, and sold have all evolved dramatically over the past few decades. The consumer goods sector industry has in its heart the technological advancement that revolutionized supply chains, becoming more continuous and interconnected. Many companies are taking this technological advancement in their strategy and engaging with consumers more directly and innovatively to allow consumers to research, purchase, and engagement with brands digitally.

Retail, as the process of selling consumer goods or services to consumers through multiple channels of distribution to earn a profit, changed its practices with the emergence of the internet, in a way that a shift was generated in both business and consumers behavior. In the digital age, an increasing number of retailers are seeking to reach broader markets by selling through multiple channels, including both bricks and mortar and online retailing.[3] In the following chapters, we are going to explore the concepts of Marketplaces and e-commerce to better associate these topics.

2.2. E-commerce and Marketplaces

E-commerce is the broad term used for the process of buying and selling physical goods over the internet, more specifically, those that are carried out by a single company, whether a manufacturer or reseller, through its own virtual platform [4]. E-commerce fully digitizes two basic processes: sales and customer service.

2.2.1. B2B and B2C

The most profitable and visible segments of the e-commerce market are business-to-business (B2B) and business-to-consumer (B2C). B2B e-commerce happens when goods are purchased and sold online between two businesses. In general, it is dedicated to selling machinery or raw materials, although it may also sell finished products. Alternatively, B2C e-commerce is used by companies that sell directly to the final consumer. Typical products sold to final customers are furniture, clothing, medicine, electronics, food, services, among others. [5]

E-commerce has its advantages. On the one hand, it offers a sales platform with a brand that already engages many customers. On the other hand, the shopkeeper can attract customers to him using this ready-to-sell structure without any initial investment, since in most cases only a fee on sales is charged. [6]

2.2.2. E-Commerce

Electronic commerce (e-commerce) has had rapid and continuous growth in the last decades, with more and more consumers preferring to trade in virtual markets [7]. The traditional marketplaces have changed in their form of physical stores and become virtual stores, changing every industry in the world.

Laudon and Traver (2016) designed eight features of the internet and e-commerce that revolutionized the way for companies to conduct their businesses [8]. From all eight, we can stand out some of them. First, the Internet is available anytime and anywhere, always leaving the market open. E-commerce allows trading to be made

worldwide, which can be accessed at any time of the day, allowing both buyers and sellers to compare offerings from different brands, cities, and countries, in opposition to buying local, as some people still tend to go to the stores that are nearby, a tendency that will fade away with globalization [9].

Second, the Web allows crossing national business boundaries, permitting a global reach for customers and companies, which makes deals more convenient and cost-effective [8]. Also, we can stand out other characteristics such as the availability of information, not only for consumers but also for competing companies that can readapt their products to increase their innovation and thrive in the existing competing market. Likewise, internet technologies allowed a new level of personalization, in a way that salesmen can target specific marketing messages to customers who show different tendencies and make changes in products or services based on the prior behavior of the customer. Finally, we can stand out the social technologies, i.e., social networks, once they allow people to connect, from all parts of the world, enabling a unique way for both companies and customers to mass-communicate [8].

As a conclusion from these aspects, we can understand that the internet made it possible for e-commerce to rise and evolve, transforming traditional businesses rules and making new ways of competition. For a fact, the number of digital buyers keeps climbing every year, as can be seen in Figure 1. In 2020, over two billion people purchased goods or services online, and during the same year, e-retail sales surpassed 4.2 trillion U.S. dollars worldwide [10]. Boosted by the covid-19 pandemic, global retail e-commerce sales grew more than 25 percent and are expected to continue to rise.

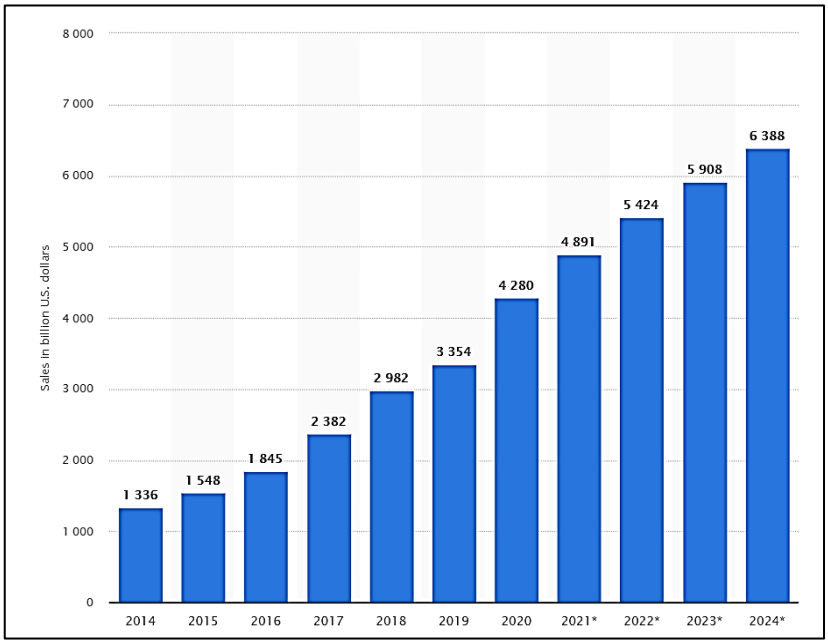


Figure 1 - Retail e-commerce sales worldwide from 2014 to 2024 (in billion U.S. dollars) [10].

Considering the example of the United States, U.S. e-commerce sales are expected to grow 17.9% this year to reach $933.30 billion. E-commerce is now on track to surpass 20% of total retail by 2024 [11].

Online marketplaces such as Amazon, eBay, or Alibaba, accounted for half of the global online shopping orders. During a July 2019 survey, it was found that digital marketplaces generated 47% of online purchases [12]. Retailer websites and apps ranked second with a 26% market share, see Figure 2.

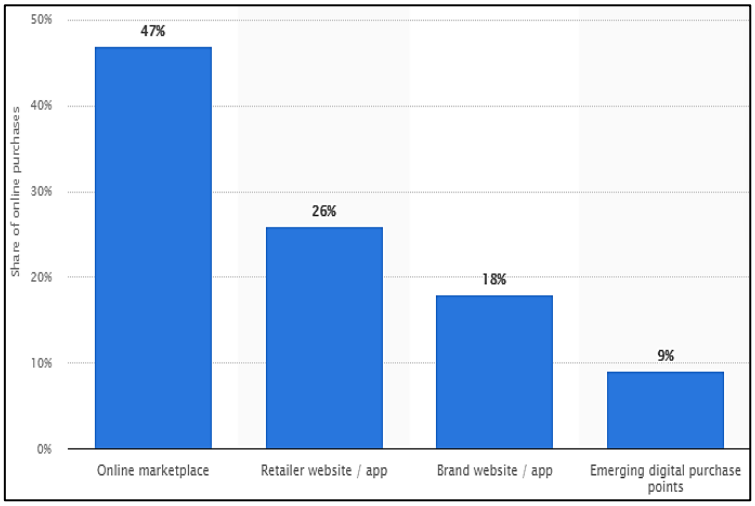


Figure 2 - Distribution of the online market purchases in percentage. (Survey from 2019)

In 2021, the online marketplace vertical is projected to increase its revenues by 44% compared to 2019 [12]. According to *GP Bullhound*, marketplaces, and large-cap e-commerce (which includes Amazon and Alibaba) are the verticals with the biggest projected segment revenue growth, as possible to see in Figure 3 [13].

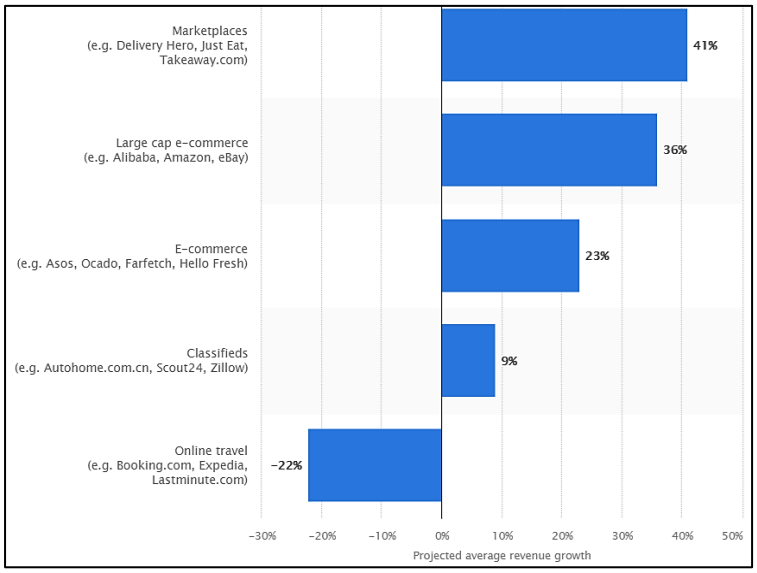


Figure 3 - Projected revenue growth of selected internet and online service company verticals worldwide from 2019 to 2021 [13].

Another important trend in the world of e-commerce is the unprecedented usage of mobile devices. In regions that lack other digital infrastructure, the adoption of mobile devices is progressing at a rapid pace, and a digital marketplace, as a platform, empowers the customer to instantly access a massive amount of information through the internet using the smartphone to make online transactions anywhere and anytime [14]. In 2021, smartphones accounted for almost 70% of all retail website visits worldwide [15].

When it comes to Covid-19, there is no doubt that the pandemic continues to have a significant influence on e-commerce and online consumer behavior all over the world. Large parts of the population were in-home curfew from early 2020 to contain the spread of the virus and ordered items online, which they usually would purchase in-store, boosting digital channels. Global e-commerce jumped to $26.7 trillion this year, driven by COVID-19 [16]. In June 2020, global retail e-commerce traffic stood at a record 22 billion monthly visits, with demand being exceptionally high for everyday items such as groceries, clothing, but also retail tech items[17]. The further progression of COVID-19 in the upcoming years will dictate the future of e-commerce and the global retail industry and define how online usage and purchasing habits will work, however, it is clear that e-commerce is booming, as a new report states that the COVID-19 pandemic accelerated the shift to e-commerce by 5 years [18].

Along with the growth of e-commerce, parcel distribution (transportation and delivery) is increasing, which results in high emissions and even greater traffic congestion in cities. The business to consumer distribution accounts for nearly 56% of the total e-commerce [19]. Consequently, one can speculate that this percentage will keep increasing because more companies are entering the online business, which results in increased demand on parcel distributors, resulting in even larger emissions and thus affecting the environment. The evolution to a more sustainable distribution is rejected by a cost-driven business, focused on keeping costs or expenses down, which is formed as the sector of e-commerce is putting pressure on the logistic service providers to lower their prices at all costs, due to high competition [19].

2.2.3. Marketplaces

The marketplace is a type of e-commerce — a variation in which the merchant puts its products for sale on a platform managed by a third party, and usually in direct competition with other firms. Unlike the e-commerce concept, marketplaces are like online malls, from which several retailers and brands sign up and compete to sell their products and services, giving the customer a range of options [3].

Marketplaces present several advantages. For users, the marketplace represents more convenience and options. After all, the customer can see, on a single website, offers from several sellers. Thus, it is possible to compare and choose the best price easily. In addition, the customer can buy from several different stores and make just one payment, instead of going through multiple payment processes on multiple sites [20].

For retailers, this easy-to-maintain alternative promotes collaboration. By advertising their products on marketplaces, companies, large or small, gain more visibility and leverage sales. In addition to visibility, companies also gain a reputation with the consumer. When a smaller, lesser-known store puts its product on the marketplace of a market giant, it manages to break some buying objections linked to a lack of trust [21].

Any company can also sell its products and services on more than one marketplace, reaching more people. Each customer may be reached more than once, as he sees the brand on different platforms. However, some care must be taken, to effectively make a profit. The description of the product or service should draw interest. It is essential to ensure consistency in product or service quality, customer service, and delivery across all sales channels. Also, regarding prices and products, it is necessary to be aware of other retailers in the same marketplace. As they are direct competitors, it must be known what others are offering and to stay competitive, by achieving a slightly more affordable price or bringing a greater variety of product options [21].

Another crucial aspect is that the marketplace itself has tools for the user to comment and rate the experience with each retailer. If these reviews generate a bad reputation online, it can affect offline businesses as well. Thus, the company must be prepared to meet the demand the market generates. If sales go up too much and the company cannot serve customers in an organized and agile manner, this will generate a negative evaluation, that will be public and have a wide reach [20].

Compared to e-commerce, the marketplace does not require as much investment in marketing or technology. The marketplace increases revenue while reducing costs, boosting profitability. Although businesses need to pay a fee/percentage of sales to the online marketplace platform, the reduced costs, by using the marketplace, makes it possible to save on investment and allow the company's team to focus on strategic activities such as advertising, marketing, product or service development, or market analysis [22].

In short, the marketplace has clear advantages regarding the projection of the products it sells and in terms of marketing, but it does incur costs and does not allow full control over brand recognition. Considering the possible disadvantages, a coherent and effective strategy must be defined.

2.3. Dimensions of Sustainability

Nowadays, we live in a sustainability urge due to the environmental problems we are going through as a human species occupying a dynamic planet with limited resources. At present, the world is still under unsustainable growth since the impacts of human actions push the world beyond its limits [23]. To preserve the planet, companies need to consider if their actions, as well as the end products or services, are sustainable or not.

One of the main foundations for sustainable development is *"that the needs and impact of the people are balanced with the ecosystem's ability to produce and recover (…) while meeting the society's development needs"*, that is, meeting current needs without compromising the ability of future generations to meet their needs, according to the United Nations [24].

The triple bottom line for sustainability congregates environmental, economic, and social dimensions, and if they are not well balanced, society's development will not be sustainable (see Figure 4). It is not the dimensions by themselves that result in a better future, it is the interaction and interface between them and the collaboration between countries. As cited in Elkington (1999) "those who think sustainability is only a matter of pollution control are missing the bigger picture" [25]. Each country must develop a clear political agenda regarding sustainable developments including all three dimensions. But besides governmental intervention, people, and companies also play an important role [24].

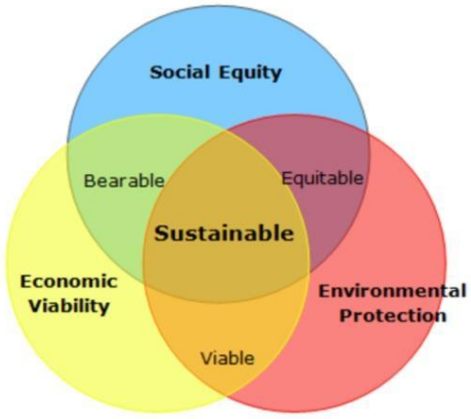


Figure 4 - Scheme of the triple bottom line for sustainability and its interactions [26].

There is mounting evidence to support that in many parts of the world, sustainability has become a life and death matter. Health issues like asthma and typhoid have been linked to deteriorating air and water quality, and in extreme cases, decreased brain function and death. The World Health Organization (WHO) estimates that 12.6 million people die from environmental health risks annually, and that environmental

factors in developing countries carry roughly 25% of the disease burden. Air and water pollution are top of mind for global consumers [27].

2.3.1. Environmental dimension

From the pillars of sustainability, the environmental dimension gives respect to the basic conditions for all life on earth and gives the basic frames for the other dimensions. It concerns the external circumstances that affect the environment, the natural resources, and the living species.[26] It deals with developing production processes and products that do not harm the environment before, during, or after usage, thus having a circular mindset. Companies focus on how to reduce their carbon footprints, waste packaging, and overall environmental impact, seeking a positive financial impact as more and more consumers come to value the efforts being made [28].

2.3.2. Economic dimension

The economic dimension gives respect to the importance of being able to economize resources and create stability, ensuring long-term economic systems [26]. Many companies focus on short-term profit to please the shareholders, while from a sustainable perspective, the focus should lie on the long-term as well. As the economy is largely influenced by demand, the new demands on fair-label products force the business and economy to be more environmentally friendly and more sustainable [29]. Companies must start to use sustainability as a competitive strategy. Economic sustainability is created through customer satisfaction and a functional global market with no trade barriers and effective use of natural resources and systems. For a fact, economic sustainability can be often emphasized as a prerequisite for a firm's growth and development since companies care more about the economic dimension as they have their focus on financial revenues and growth. Despite this, no company nor country can achieve sustainable economic growth if prosperity is unfairly distributed and the environment is deteriorating, so we can state that all the sustainability dimensions are equally important [29].

2.3.3. Social dimension

The social dimension comprises aspects of cultural development and human needs, more precisely, equality, even though there is no stated definition for this dimension [26]. As a starting point, this dimension requires that everyone should have access to housing, clean water, work, and healthcare. It also means paying attention to

the entire supply chain and making sure people involved in creating products are treated and compensated fairly [28].

The problems that humanity fights today do not only account for economic prosperity or environmental quality, but they also raise political and social issues. The great paradox, however, is that even though the issues exceed the capabilities of corporations and businesses worldwide, they are also the ones who have the resources, motivations, technology, and global reach to attain sustainability [25].

The perfect condition would be to engage the world and its countries in collaborative efforts to obtain optimal economic-ecological-social solutions to reduce the emissions and their negative impact on the planet.

As e-commerce is growing rapidly, there is a critical and current need for increased knowledge and involvement of sustainable thinking within e-commerce on virtual marketplaces. Studies have been made regarding the environmental side of e-commerce, the economic side, and the social side, but within the body of literature, there is a prominent gap concerning the combination of the three dimensions together in the scope of e-commerce, and the possible trade-offs companies must make when improving areas within their sustainability. However, a study on sustainable e-commerce concluded that communication is a key aspect in development, as everyone needs to be reminded of why one should act sustainably, and which necessary trade-offs need to be made. Also, the customer has the main “control” over the market. The consumption behavior of today is not always sustainable, thus there are some incremental changes that companies can make to embrace sustainable development. Companies need to inform customers on why they should choose more sustainable products, what the products can contribute with, and how the products or the company itself affect the environmental, economic, and social dimensions of sustainability. The work also concludes that the way to increase awareness with the customers is for companies to provide them with information. The trade-offs that emerged through the study showed that the economic dimension of sustainability is predominant over the other dimensions since companies usually need financial resources to improve their work within the other two dimensions [29].

There is not a standard way of conducting sustainability improvements, once companies from different countries follow different regulations and there are different international sustainability laws, which creates a challenge in merging the e-commerce and the sustainability dimensions**.** If there are too many laws and regulations, with a wide scope, companies are most likely to enforce the minimum level of compliance since otherwise would require much more work and commitment [30]. So sustainable values must be delivered to society, which should also be a starting point for change.

2.4. Consumer and Sustainable Behavior

Consumer knowledge, awareness, and concern regarding the environment are increasing as more and more people adapt to consider environmental issues when shopping [31]. Furthermore, overall consumers have shown willingness to pay a higher price for an environmentally friendly product [32]. A product is environmentally friendly or “green” if it causes none or minimal harm to the environment [33]. Nevertheless, transforming global practices into sustainable ones may well represent one of the greatest challenges of the 21st century, as balancing the three pillars of sustainability represents a big challenge.

A Capgemini study shows that consumers change their preferences according to sustainability criteria, showing the existence of a direct relationship between sustainability and the consumer goods business, specifically concerning increasing the level of customer loyalty and revenue from brands [34]. Additionally, it examines the impact of sustainability in buying patterns and how consumer and retail companies manage client expectations. The study concludes that sustainability moved up the list of customer priorities: 79% of consumers are changing their shopping preferences based on social responsibility, inclusion criteria, and the environmental impact of brands.

In addition, the COVID-19 pandemic increased consumer awareness and commitment to more sustainable purchases: 67% of consumers said they are more aware of the scarcity of natural resources due to the Covid-19 crisis, and 65% said they will be more attentive to the impact that their level of global consumption may have on the "new normal" [34]. The study also shows that many consumers switched to lesser-known brands for being more sustainable, as their concerns about sustainability began to have a decisive influence on their behavior. When it comes to the company’s point of view, 77% of the companies surveyed said that sustainability promotes an increase in the level of customer loyalty, while 63% stated that it promotes the growth of revenue generated by the brands.

Despite all this, consumers and companies still have a lot to learn about sustainability. There is a gap between what consumers think they know and what they really know about sustainability. For example, 78% of consumers are unaware that it takes 1,000 liters of water to produce a chocolate bar, and 68% are not aware that an average hamburger generates more carbon emissions than traveling 15km in a car [35].

When exposed to the issues involved with the acquisition/consumption of these products, around 68% of consumers were willing to buy more sustainable products. However, both retailers and manufacturers overestimate the level of knowledge of their customers regarding the sustainability of their brands. While 65% of managers reported

that their customers are familiar with their brands' sustainable development initiatives, 49% of consumers said they did not have the information they need to be able to verify the sustainability claims of the products, and 44% even stated that they do not trust the information provided by the brands. This exposes the need for a platform that unifies information with truthfulness [35].

Overall, the main challenge in the matter of sustainability turns out to be the management of change. Although many companies have the perception that sustainability is more expensive, there are initiatives such as reducing waste or increasing energy efficiency, which reduce operating costs. Arguments are needed that show the benefits, influence, and inspire people so that they understand that they can make a difference. Also, the Capgemini study shed light on the four best practices that companies can adopt to accelerate sustainability and drive their long-term programs [34]:

- Educate consumers and empower employees to adopt sustainable practices: Companies must play a key role in highlighting the sustainability footprint of their products, given the low consumer awareness of environmental impact.
- Putting technology at the heart of sustainability initiatives: Companies must align their use of technology with broader sustainability goals to ensure a measurable return of investment.
- Implement a strong organizational structure to promote sustainability, execute their strategy in all business units, oversee defined objectives and strengthen relationships with their external stakeholders.
- Collaborations around sustainability within companies' internal networks contribute to creating common commitments and to mitigating the environmental and social impacts intrinsic to the supply chains of this sector.

A previous study addressed a gap in understanding how consumer values and perceptions of the marketplace practices influence consumer support for sustainable businesses**.** Without an adequate understanding of this subject, threats to the environment will continue to increase over time, such as the levels of greenhouse gasses in the upper atmosphere, scarcity of fresh-water resources, and intolerable levels of pollution in the air humans breathe. These threats are likely to increase without a close focus on sustainable business practices, and marketing programs to be developed in the future. Research has shown that businesses present the potential to have a great influence on environmental degradation both in their operating practices as well as in encouraging and informing consumers to operate sustainably as well [36].

A survey from Nielsen, about how global consumers seek companies that care about environmental issues by adjusting their shopping habits, concluded that people all

over the world show a lot of concern about certain problems such as air pollution, water pollution and shortages, food waste, and pesticides as is possible to see in Figure 5. Another stat of their survey concluded that a whopping 81% of global respondents strongly felt that companies should help improve the environment [31].

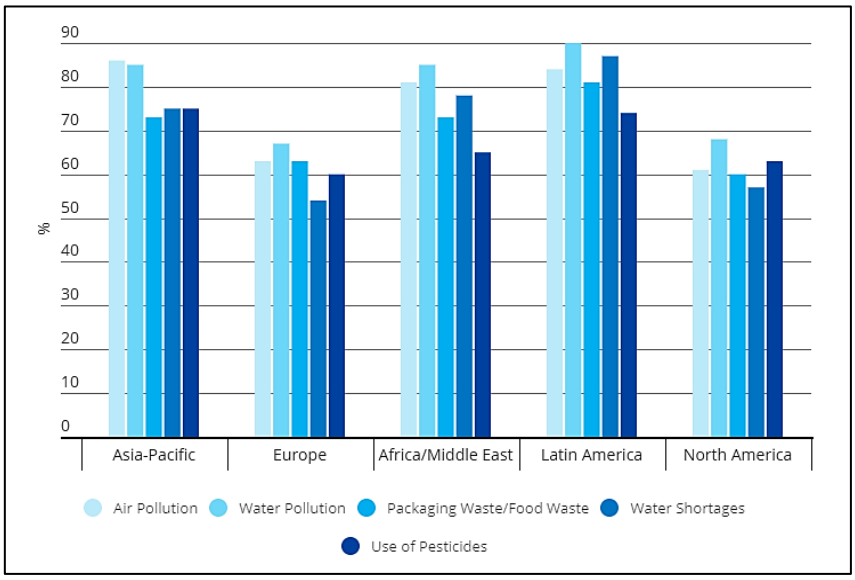


Figure 5 - Bar chart displaying the percentage of respondents who are extremely or very concerned about the mentioned environmental issues [31].

Consumers are becoming more demanding, and corporate sustainability is in high demand across gender and generations, with respondents saying that it is “extremely” or “very” important that companies implement programs to improve the environment. This passion for corporate social responsibility is shared across Millennials, Gen Z, and Gen X who are the most supportive, but older counterparts aren’t far behind. Corporate responsibility and sustainability strategies may take different shapes around the world, but one thing is clear: Consumers are using their spending power to effect the change they want to see [31].

A survey of 6,000 consumers in North America, Europe, and Asia found that 72% of respondents reported actively buying more environmentally friendly products. Research by NYU’s Stern School of Business found that 50% of the growth from consumer-packaged goods from 2013-2018 came from products marketed as sustainable [28].

An article by “*The Marketing Research Institute*” proves how sustainability is increasingly important to companies' long-term strategy. New consumption patterns have been verified, and the current consumer is not focused on products, services, and prices, but on experiences with a meaning that allow him or her to strengthen ties and identity. At the top of the trends for the coming years in terms of sustainability, are the purchase movement based on “zero waste”, without packaging, the intelligent and

aesthetic use of alternative raw materials that are by-products of other companies and industries, the new revenue streams linked to the repair of products and the resale market for used products [37].

Millennial generation consumers, who now represent the largest portion of the working population and with greater purchasing power, are willing to pay more for sustainable products and are looking for certain logos, called eco-labels, seals, and sustainable and environmental certifications on the packaging of the products, to obtain information on their ecological impact and make a sustainable decision. Consumers want less talk and more action. Thus, it is important to keep the concepts of trust, transparency, and traceability of the value chain at the forefront of sustainable business models strategy [37].

2.5. Sustainable E-commerce and Marketplaces

Sustainable e-commerce and marketplaces are closely linked to the circular economy. In the past decade, the circular economy (CE) grew into a global knowledge community focused on decoupling environmental and economic wellbeing. The concept of a circular economy has been around since the 1970s but was popularized by Ellen MacArthur in 2010, who now champions the idea. The Ellen MacArthur Foundation described the circular economy as “restorative and regenerative by design and aims to keep products, components, and materials at their highest utility and value at all times and opportunities” [38]. Such opportunities can potentially reduce expenses and reinforce the financial performance of a business while reducing their environmental impact regenerating natural systems. In this context, bridging the gap between sustainability and online e-commerce and marketplaces becomes fundamental.

2.5.1. Sustainable e-commerce

E-commerce businesses are transitioning to a sustainable model, and brands both big and small are looking for greener initiatives and rolling out their plans to make their businesses more sustainable [29]. For example, Amazon announced to offset the company’s enormous greenhouse gas emissions and make Amazon carbon neutral by 2040 [39]. CEO Jeff Bezos even pledged $10 billion of his own money toward the projects combating climate change [40]. Fast-fashion brand Zara has pledged to make all its brands use only organic, sustainable, or recycled materials for their clothing by 2025. They also plan to transition to zero landfill waste and to use renewable sources to power 80% of their distribution centers, offices, and stores [41].

There are several steps companies can make to move towards sustainable e-commerce. Examples go from sustainable shipping, reduced packaging, to recycling policies. As for ethical e-commerce, it is related to the integrity and responsibility of the company (behind the website). Future research about sustainable marketing and support for sustainable businesses might give attention to how consumers make ethical evaluations, as this is not a very developed subject and deciding on the moral limits of the market is one of the great challenges of contemporaneity [42].

A study on e-commerce explored how to integrate the dimensions of sustainability within the e-commerce sector, and its findings suggest that the actions a company may make need to be thoroughly communicated through their websites since e-commerce disables face-to-face interactions. It is of great importance for companies to increase consumer awareness and knowledge to motivate them into being sustainable [29].

2.5.2. Sustainable Marketplaces

Sustainable and Ethical marketplaces are companies that provide access to a cleaner, safer, and healthier lifestyle through natural and sustainable products, while empowering local sellers and artisans to reach their true potential.

It is not enough to sell sustainable products, those who adhere to the marketplace must develop an efficient marketing strategy to reach customers who share or are interested in the topic. Traditional marketing seeks to attract the consumer and for that, it is based on the principles of traditional economics, where the main objective is to achieve the greatest profit and not necessarily the least environmental and social impact. Sustainable marketing not only seeks profit and economic balance but also promotes product appreciation through sustainability [36].

This occurs through a series of benefits for the brand, ranging from the product's life cycle, through reverse logistics, awareness of customers and employees, aiming at the company's social capital in the long term. Companies, thinking about sustainable marketing and marketplace, created a specific structure for this segment, where the same traditional concepts are used, but with greater value, in the sustainable management of the 4P's of marketing (product, price, point of sale, promotion). In this way, the price of a sustainable product must rely on different variables, ranging from taxation, suppliers with sustainable actions, expenses, and target customers [43].

It is possible to verify that sustainability is a trend in several markets, such as the Free Market in Latin America. In August 2019, the site gained a specific section for these items, but in July 2020 (one year after the creation of the space), the study "Growth of sustainable consumption online in Brazil and Latin America" was presented - published

by the marketplace. Analyzing the report, it is possible to understand that the search for nature-friendly products has been gaining more and more space in the buyer's cart. Between June/2019 and May/2020, 2.5 million Latin Americans purchased at least one item with a sustainable proposal. In Brazil alone, there were 1.4 million consumers (56% of the total). The study not only shows the presence of sustainable customers and products in the marketplace but also sellers. Between 2017 and 2020, there was a 198% growth in the number of Brazilian sellers offering items with a sustainable proposal (45% of the total in Latin America) [44]. This goes to show as an example of how sustainability is being more present in online markets.

2.6. Market Research

Market research is the process of determining the viability of a new service or product through the development of studies directly with potential customers. It allows the segmentation of a target market and gathers feedback from consumers about their interest in the product or service [45]. Furthermore, it usually takes the form of a survey.

2.6.1. Market Leaders

There are several market leaders in the world of e-commerce. As of 2019, online marketplaces account for the largest share of online purchases worldwide. Some of the most well-known marketplaces include Amazon, eBay, Walmart, Etsy, Alibaba.com, Google Express, or even Facebook Marketplace [46].

Leading the global ranking of online retail websites in terms of traffic is Amazon: The Seattle-based e-commerce giant that offers e-retail, computing services, consumer electronics, and digital content registered over 5.2 billion unique visitors in June 2020. Being the most famous marketplace in the world, and the largest in many countries, Amazon continues to dominate the marketplaces universe, selling from a wide variety of products, like smartphones, computers, home and kitchen, tools, smartwatches, gaming, tablets, cameras, lawn and garden, office products, home entertainment, and headphones, for example. In 2020, Amazon surpassed Google and Apple as the most valuable company in the world, being worth $60 billion more than Google and $80 billion more than Apple [10].

GP Bullhound, a leading technology advisory and investment firm, made a report concerning the final quarter of 2020, with their views on current trends in marketplaces. From the main conclusions, Direct-to-consumer businesses saw huge growth in the last decade as part of the e-commerce boom, and the trend is shifting with increasing internet-native brands selling exclusively through third-party marketplaces, and more

specifically, Amazon's marketplace [13]. In Figure 6 we can see the market cap of leading marketplaces and online service companies worldwide as of June 2021.

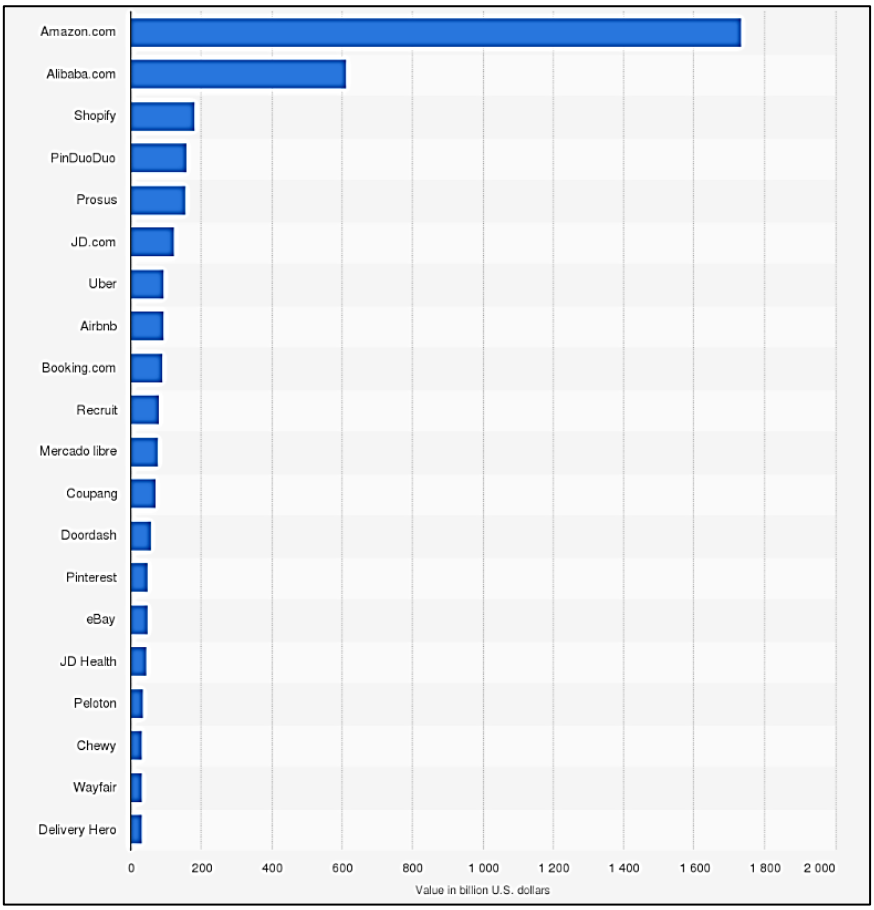


Figure 6 - Market cap of leading consumer internet and online service companies worldwide as of June 2021 (in billion U.S. dollars) [46].

Another report from *CB Insights*, a technology platform that provides companies with data, expert insights, and works management tools, analyzed how rising e-commerce players are competing against Amazon [47]. Amazon is the most formidable force in e-commerce. However, emerging e-commerce players are protecting their businesses from being disrupted by the retail giant. In a challenging year for retail, Amazon posted blockbuster results — in 2020, the e-commerce giant saw net sales hit $386B, a 38% surge year-over-year (YoY) [47].

Emerging retail companies are tapping into these trends to build a competitive advantage in the e-commerce industry. First, CB Insights highlighted that, in line with GP Bullhound, we can see more and more Niche assortment companies that focus on a narrow product assortment and gain popularity. Compared to big-box retailers, companies focusing on a specific niche have the advantage of credibility and focus, and thus, can foster greater customer loyalty. Second, distinctive convenience companies strive to deliver ease and speed as a service. With people staying at home more than ever, services that deliver convenience above all else are becoming increasingly popular.

Also, social connection companies promote product discovery, connection, and sales. Lastly, we can stand out as personalization companies that focus on merchandising and product customization, and sustainability companies, the most important, from which companies strive to reduce material waste, add more efficient products and services, and incorporate more transparent messages [48].

While Amazon is working on making half of all shipments net zero carbon by the end of the decade, concerns regarding its environmental impact aren't going away. As one of the top shippers in the world, Amazon saw its carbon emissions rise 15% in 2019 to 51.2M metric tons, the equivalent of 13 coal-burning power plants running for a year, thanks to its dependence on fuel-powered trucks and planes to deliver its goods. In 2019, it produced at least 115M+ pounds of plastic waste in its packaging as well. Eco-conscious consumers are looking for green alternatives; so are investors [48].

When it comes to the world's top online marketplaces in 2021, a study from Web Retailer compiled over 155 marketplaces that have more than one million visits per month, understood the most popular product categories, and the best-served regions and countries [49]. The top four product categories included fashion, books, homewares, and electronics. Some of the companies and their properties may be found in Table 1.

Table 1 - First 20 top online marketplaces in 2021 and their characteristics [49].

Rating (#)	Name	Region/Country	Product Category	Visits/month
1	Amazon	Global	General	5.2B
2	eBay	Global	General	1.7B
3	Mercado Libre	Latin America	General	683.9M
4	Rakuten	Japan	General	575.8M
5	AliExpress	Global	General	534.4M
6	Shopee	Southeast Asia	General	457.9M
7	Walmart	USA	General	410.3M
8	Etsy	Global	Arts, Crafts & Gifts	391.8M
9	Taobao	China	General	329.4M
10	Pinduoduo	China	General	241.5M
11	Trendyol	Turkey	General	206.2M
12	Allegro	Poland	General	190.2M
13	Target	USA	General	182.2M
14	Wayfair	North America, Europe	Homewares	179.1M
15	JD.com	China	General	178.8M
16	Flipkart	India	General	176.9M
17	Wildberries	Russia	General	154.5M
18	Tokopedia	Indonesia	General	140.1M
19	Lazada	Southeast Asia	General	137.6M
20	Zalando	Europe	Fashion	134.8M

Amazon and eBay are at the top of the list, with Amazon pulling in over five billion visits per month and eBay getting 1.7 billion. Latin America's Mercado Libre is third on the list. Only Amazon and eBay break the one billion visits mark, although Mercado Libre, Rakuten, and AliExpress aren't too far behind with over 500 million visits per month each. Looking at the product categories, the top 20 marketplaces sell general merchandise, with only three specializing in a specific product category. Etsy, popular for handmade and craft items, is the largest of these marketplaces, and it is a surprisingly strong niche when we consider that competing marketplaces are trading in mass-produced products such as electronics and clothing.

In the top 20, there is a 40/60 split between marketplaces that are *only* marketplaces and those who are retailers themselves. Amazon is the best-known retailer with its marketplace but there are also relevant companies that added marketplaces to their existing retail websites, such as Walmart, JD.com, and Target. These companies seek to give shoppers a larger product choice and make price competition between sellers.

There is a diverse mix represented in the top 20 when it comes to geographic regions. Four are global brands, but there are also marketplaces in China, North America, Japan, Southeast Asia, India, Latin America, and Europe.

To comprehend the marketplace size, the Gross Merchandise Value (GMV) would be the ideal characteristic to measure, however as it is not always available for most online marketplaces, the visits/month values are estimated, using SimilarWeb data from April 2021. In Table 2 it is possible to see the top product categories sold by online marketplaces, their amount, and the number of visits per month.

Table 2 - Marketplace size and number of marketplaces according to their categories [49].

Rating (#)	Product Category	Marketplaces	Visits/month
1	General	93	13.5B
2	Fashion	31	644.0M
3	Arts, Crafts & Gifts	3	402.5M
4	Homewares	7	281.2M
5	Electronics	6	80.8M
6	Music	2	80.3M
7	Books	5	42.8M
8	Sports	3	22.9M
9	Musical instruments	1	16.8M
10	Collectibles & Antiques	2	6.4M
11	Toys & Baby	2	6.0M

Exploring the top product categories sold by online marketplaces, general marketplaces, from which a wide range of products are sold, are by far the most common type, comprising nearly 60% of all marketplaces, and 17 out of the top 20. The second spot is taken by fashion marketplaces, despite only being featured at number 20, with Zalando. Next comes the Arts, Crafts & Gifts category, although it is mainly down to Etsy.

From this study, other considerations can be made. One of the most popular online marketplace niches is clothing and accessories, noting that retailers who have added an online marketplace to their websites, such as Zalando and ASOS, make up half of the entire fashion marketplaces list considered. This goes to show the importance of implementing a marketplace in a business.

Regarding the niche of marketplaces per country, the study concluded that the United States has a stronger market than Europe, with 53% of US marketplaces aiming at product categories versus 47% in Europe [49]. This is especially evident in the top ten, with homewares, fashion, and crafts all present. Amazon keeps dominating in the United States, as they received a massive two billion monthly visits from American customers. In Europe, people use a huge range of different sites, which likely happens because Europe consists of many developed economies with good transport, internet, and payments infrastructure, but also many different languages and cultural differences. The most popular marketplace in Europe is Amazon with 1.4 billion monthly visits. 70% of the top 20 marketplaces are categorized as general, selling a wide range of different products [49].

In the UK, Amazon and eBay are the most popular, and the most popular categories are fashion crafts, homewares, and music. In China, shoppers visit a variety of different marketplaces, all selling a variety of goods, and from the top ten markets, half of these are Chinese companies. In Japan, only six marketplaces are visited by more than one million Japanese shoppers per month, with Amazon ranking first place with 556 million visits, followed by Rakuten that has 544 million, and Mercari which has 75 million. Despite being a developed economy and the third-largest by GMV globally, Japan has an unexpectedly narrow range of popular online marketplaces [49].

2.6.2. Ethical and sustainable markets worldwide

As we could see by what was already mentioned in this thesis, sustainable markets are both a tendency and an opportunity. According to the European Commission, the global market for goods and services with a low environmental footprint is worth 4.2 billion euros, with 26% of European citizens buying this type of regular product [50]. Fair trade shops online, which include fair labor standards, organic ingredients, and give-back initiatives, is possible to highlight, as examples, some of the

following ones. *B The Change*, an online media platform that informs and inspires people who have a passion for using business as a force for good in the world, investigated ethical marketplaces on the web to shop for social-good products. Some of them are social enterprises themselves, and give back some of their profits, as do the products they feature on their site [51].

- **Cambio Market**, a company from the Philippines, has an online marketplace that sells handmade and ethically sourced boutique products, such as jewelry, bracelets, bags, etc. Every Cambio Market's purchase supports social enterprise partners and gives back to a social cause. As an example of an ethical marketplace, their commitment focuses on three different aspects. First, on local empowerment, as their products are made and designed by community artisans and sourced locally. Second, on ethical production, as they seek to minimize negative environmental impacts and allow artisans to be self-sufficient economically and socially by having good working conditions. Last, concerning culture, as they try to find a union between modern designs with indigenous crafting traditions.
- **Lochtree,** a direct-to-consumer marketplace, exclusively provides sustainable & eco-friendly products. Some of its marketing strategies present the brand to be a guide to sustainable living, making it easy for consumers to find great eco-friendly products while helping create positive environmental change. They sell from household goods to laundry and cleaning products, bath and body, food storage, and even games. Their core objectives are to build a marketplace and community that promotes positive environmental change, providing high-quality, convenient eco-friendly products, and outstanding support to customers and suppliers.
- **Threads Worldwide** sells jewelry from women around the world, bringing their artisanal skills to an abundant marketplace in the US. Their goal is to bridge the gap between the woman who wears it and the woman who made it. They have an interesting marketing strategy, since the categories on the marketplace website are divided into the country, with products from Bolivia, Guatemala, Indonesia, divided into types, such as bracelets, earrings, necklaces, bags, and accessories, into style, from delicate to multi-wear, and tones, from silver to gold. This thus represents a wide variety of analyses from the perspective of the consumer.
- **Sari Bari** employs women who have been exploited in sex trade or are vulnerable to human trafficking. These women are trained as artisans to create handmade clothing crafts, receiving paid training, fair wages, health insurance, school support for their kids, and even retirement benefits.
- **Earth Hero**, an eco-friendly online marketplace, extremely general, in a way that the customer can pick from products that are sourced, manufactured and shipped

sustainably. Products are made with low-impact materials, whether that's recycled content, organic or renewable ingredients. Each partnering brand has been chosen accordingly with several factors related to better materials, cleaner production, lower carbon footprint, higher quality, and less waste.

- **Alternative Apparel** assumes itself to be sustainable, as they are committed to eco-materials and responsible manufacturing, delivering casual, comfortable clothing. The clothes they sell are from organic cotton and recycled polyester. They integrated the rank of the "2021 World's Most Ethical Companies". Their garments are crafted with sustainable materials & processes, including organic & recycled materials, low-impact dyes & water-conserving washes.
- **ABLE** is a brand focused on ending generational poverty by providing economic opportunities to women. This business became an opportunity to earn a living, empower them to end the cycle of poverty. Armed with multiple studies illustrating how the employment of women benefits and strengthens the entire community, the ABLE team set out on a mission to end generational poverty, one job at a time. They sell home goods, bags, shoes, apparel, and jewelry.

Despite the growth of ethical and sustainable fashion and lifestyle products, the same growth has also led to a whole lot of *"greenwashing"* and *"fair-washing"*. Therefore, it is important to further analyze the abovementioned companies to ensure that the sources used in the research are truly responsibly-made products the average customer can trust [52].

Being aware that the terms "ethical", "sustainable", and "conscious" can take on unalike meanings to different people based upon their personal value systems, it is verified that each site curates and sorts their goods based on standards (such as artisan-made, vegan, eco-friendly, fair trade, BIPOC-owned, etc.). According to a study on different sustainable & fair-trade online stores for truly conscious shopping [53], we can highlight some of the main important criteria:

- **Ethical**: these are products from brands that follow just production practices such as paying fair wages, ensuring safe working conditions, and more.
- **Sustainable**: products made with responsibly sourced materials like earth-minded fibers and dyes. Brands using earth-minded materials (natural fibers and recycled materials), processes, and packaging throughout their supply chain.
- **Cruelty-free**: ensures that no animals were killed, hurt, or tested on in the making of these goods.
- **Women-Owned**: pieces from brands that are at least 51% owned by a woman or woman. Supports women's entrepreneurship and helps reduce the gender income and business owner representation gaps.

- **BIPOC-Owned**: supports inclusive representation in the conscious lifestyle space and helps reduce the racial wealth gap by empowering businesses owned by Black, Indigenous, and People of Color.
- **Toxic-Free**: products that have been thoroughly vetted and verified to not contain harsh chemicals.
- **Fair Trade**: pieces from fair trade-certified brands or brands following fair trade practices such as ensuring safe working conditions and paying living wages.
- **Heritage**: goods made with generations-old crafts and traditional techniques that honor the cultural heritage in the communities they are produced.
- **Vegan**: pieces that are completely free of animal products.
- **POC-Owned**: these are products from brands that are at least 51% owned by a Person of Color or People of Color.

Additionally, in Table 3 are the most reliable marketplaces and e-commerce protagonists of the emergent market of sustainable and ethical businesses. Although knowing the country's providence of each business is important, at this stage this wasn't highly and particularly noted, overall companies are from the United States, having some other businesses in Asia, Europe (UK), and Australia, for example.

Table 3 - Ethical and sustainable marketplaces worldwide

Marketplace	Website	Category
The Little Market	https://www.thelittlemarket.com/	Home goods like baskets, candles, and serve ware, handmade products
Envly	https://www.envly.co/	Varied
Purity Style	https://www.puritystyle.com/	Home, gift, and clothing
The Future is Good	https://thefutureisgood.co/	Home and personal care
Thrive Market	https://thrivemarket.com/	Groceries, natural bath & cleaning products, wine & coffee
Pildora	https://pildora.com/	Organic and sustainably made fashion & beauty
Done Good	https://donegood.co/	A centralized market & browser plug-in for do-good products, home, food and drinks, self-care, accessories
Accompany	https://www.accompanyus.com/	Apparel, home, jewelry, bags, shoes, accessories, gifts
Made Trade	https://www.madetrade.com/	Fair trade, sustainable apparel, shoes, bags, accessories, home decor, furniture & lighting
Verishop	https://www.verishop.com/	Apparel, home goods, beauty & skincare products
Fair Trade Winds	https://www.fairtradewinds.net/	Apparel, bags, jewelry
Ethica	https://shopethica.com/	Organic & natural beauty products, women's clothing, jewelry, shoes, bags, beauty
Petit Vour	https://www.petitvour.com/	Cruelty-free & vegan products, fashion, beauty, and home goods
Rêve En Vert	https://reve-en-vert.com/	Clothing, shoes, bags, accessories, beauty, home
Two Layer	https://twolayerco.com/	Sustainable fashion
Society B	https://www.societyb.com/	Thoughtful & affordable home goods; Fair trade clothing, jewelry, and accessories

Ten Thousand Villages	https://www.tenthousandvillages.com/	Fair trade jewelry and kitchen wares, Accessories, Home Goods, gifts, holiday decor
Grove	https://www.grove.co/	Variety of household cleaning items, personal care products, and their new line of skincare
Package Free Shop	https://packagefreeshop.com/	Clothes and accessories, beauty, personal care, and kitchen goods
Zero Waste Store	https://zerowastestore.com/	Variety of products, home and kitchen, apparel, cleaning, skin care and personal hygiene
Wild Minimalist	https://wildminimalist.com/	Essentials for kitchen, bath, clothing, and mom/baby care
ThredUp	https://www.thredup.com/	Online retailer for second-hand clothing, shoes, and accessories
Earth Hero	https://earthhero.com/	Clothing, home goods, personal care, tech, and travel goods
Better World Books	https://www.betterworldbooks.com/	Used and donated books
Cambio Market	https://www.shopcambio.co/	Handmade and ethically sourced boutique products, such as jewelry, bracelets, bags
Lochtree	https://lochtree.com/	Home goods, beauty, and skin care products, baby toys, family games
Threads Worldwide	https://threadsworldwide.com/	jewelry, bracelets, earrings, necklaces, bags, and other accessories
Sari Bari	https://saribari.com/	Ethical and sustainable fashion
Alternative Apparel	https://alternativeapparel.com/	Sustainable fashion, clothing, shirts, pants, shoes
Rock Flower Paper	https://rockflowerpaper.com/	Textiles, clothing, bags
Able	https://www.livefashionable.com/	Home goods, bags, shoes, apparel, jewelry
Our Common Place	https://www.ourcommonplace.co/	Varied, from fashion to beauty and wellness, to home and gifts
Itemerie	https://itemerie.com/	Home Goods, kitchen, cleaning, beauty, jewelry, accessories
Galerie.LA	https://galerie.la/	Clothing, bags, shoes, accessories, beauty, and lifestyle
Fox Holt	https://fox-holt.com/	Clothing, accessories, beauty, home
Goodee	https://www.goodeeworld.com/	Homewares, gifts, furniture, decor, bath + body, kitchen + dining, lifestyle
Fair Anita	https://fairanita.com/shop/	Jewelry, clothing, bags, gifts
Mercado Global	https://www.mercadoglobal.org/	Artisan crafted Handbags
Eco-Stylist	https://www.eco-stylist.com/	Clothing
ISHKAR	https://www.ishkar.com/	Jewelry, homeware, to wear, kilims & carpets
Madison Grace	https://www.madisongrace.co/	Bags, jewelry, home, or office items
Artisan and Fox	https://artisanandfox.com/	Jewelry, accessories, home goods
Gifts for Good	https://www.giftsforgood.com/	Apparel, accessories, bags, food & beverage, others
Azura Bay	https://www.azurabay.com/	Lingerie, undies, swim, and loungewear
Made Trade	https://www.madetrade.com/	Fair trade, sustainable apparel, home + furniture, clothing, shoes, and accessories

After collecting some of the most recognized marketplaces in sustainable and ethical businesses, another search was made, about the companies that are listed on the stock exchange. In corporate finance, a company listed on the stock exchange is obliged to disclose periodic financial information, describing the company's activity in each period such as management reports, balance sheets, incomes, and cash flow statements [54]. For instance, we can find out market caps, which are an estimate of the

market value of a company according to expectations about future preservation and monetary conditions [55]. Companies listed on a stock exchange can quickly raise affordable capital by issuing more shares for investors to purchase. The capital raised from the issuance of shares can be used to help the company grow and pay for different business costs [56]. Examples of stock market indexes are NYSE, The New York Stock Exchange, and Nasdaq Composite, one of the three most followed stock market indices in the United States [57].

Table 4 - Sustainable and ethical marketplaces analysis according to Yahoo Finance and Crunchbase (March 2021) [54].

Marketplace	Category	Country	Last Funding Round ($)	Date	Investors
Grove	Variety of household cleaning items, personal care products, and their new line of skincare	USA	125,000 k	Dec 10, 2020	4
Ten Thousand Villages	Accessories, Home Goods, Gifts, Holiday Decoration	USA	50,000	Dec 28, 2020	n.s.
Verishop	Apparel, home goods, beauty & skincare products	USA	400,000	Nov 26, 2019	n.s.
Thrive Market	Groceries, natural bath & cleaning products, wine & coffee	California, USA	20,000 k	Oct 24, 2019	1
Package Free Shop	Clothing and accessories, beauty, personal care, and kitchen goods	USA	4,500 k	Sep 26, 2019	6
ThredUp	Online retailer for second-hand clothing, shoes, and accessories	Oakland, California, USA	175,000 k	Aug 21, 2019	n.s.
Done Good	A centralized market & browser plug-in for do-good products, home, food and drinks, accessories	Washington DC, USA	508,198	Sep 24, 2018	n.s.
Accompany	Apparel, Home, Jewelry, Bags, Shoes, Accessories, Gifts	NY, USA	20,000 k	Dec 5, 2016	2
Better World Books	Used and donated books	USA	18,000 k	May 10, 2016	n.s.

n.s. - not specified

In Table 4 we highlight some of the sustainable and ethical marketplaces found with investment rounds on the stock exchange. We can see that all companies are based in the United States, suggesting that there is a lot of ethical and sustainable entrepreneurship in the country. Among the 9 marketplaces referenced, we can emphasize those who had more than one million dollars of investments in the stock exchange. Further down the list, we can find companies such as Package Free Shop, Better World Books, Thrive Market and Accompany, which had over a million dollars of investments, but not much more than that. This sustainable marketplace is diverse, having from home wares, clothing and accessories to health and body items, bags, and groceries. Another factor to stress out is that Package Free Shop helps their brands take steps to reduce their waste by having a strict packaging policy, stimulating companies to reduce plastic usage, packaging, and waste [58]. Better World Books [59], a specific-

niche marketplace for used and donated books, gathered 18 million dollars in funds by May 2016.

Then, further up the investment scale of the last five years, we see, with the last investment round of 20 million dollars, Thrive Market, in 2019, and Accompany, in 2016. Thrive Market is an American e-commerce membership-based retailer offering natural and organic food products, but also homewares, beauty bath, and body products. They do ethical and sustainable sourcing, carbon-neutral shipping, zero-waste warehouses, and recyclable/compostable packaging [60].

Accompany is an ethical marketplace that sells apparel, home, jewelry, bags, shoes, accessories, and gifts. Their marketing strategy aims to show that fashion is a force for good, changing business in a way that supports economic equality, protects cultures, and improves the quality of life for communities in the world. They sell handmade & artisanal crafts, supporting small villages and indigenous communities, where they go to find local artisans. The pieces are usually handmade, limited-edition, and one-of-a-kind, and reflect a rich cultural heritage. Their humanitarian collections benefit cause-focused programs and projects, such as Fair-Trade Practices, for example, ensuring that profits return to the community, and are not exported and /or absorbed by a small group of owners [61].

On top of the list is ThredUp, an online retailer for secondhand clothing, shoes, and accessories [62]. The company had the last funding round of 175 million dollars in 2019, followed by Grove, with 125 million dollars of investment last year. The last one is focused on natural cleaning, home & personal care products, aiming at bringing to the customer everything he needs for a sustainable home.

On the other hand, ThredUp is one of the world's largest online resale platforms for women's and kids' apparel, shoes, and accessories, being their mission to inspire a new generation of shoppers to think secondhand clothes first, from a sustainable point of view. As an online retailer for secondhand clothing, shoes, and accessories, considering their huge investment round in 2019, we can therefore verify the fashion industry tendencies in sustainable markets.

Table 5 - Money raised by ThredUp in funding rounds from 2012 until 2019 by Crunchbase [62].

Organization name	Funding type	Money raised ($)	Announced date
ThredUp	Series F	175.000 k	Aug 21, 2019
	Series E	81.000 k	Sep 10, 2015
	Series D	25.000 k	Jul 29, 2014
	Series C	14.500 k	Oct 3, 2012
	Series C	n.s.	Oct 1, 2012

n.s. - not specified

As we can see in Table 5, a search made on Crunchbase, a platform to find investment and financing information about private and public companies, showed the money raised by in funding rounds from 2012 until 2019, verifying that there has been a massive growth in investment rounds for ThredUp, revealing how sustainable fashion is a tendency in online markets.

2.6.3. Ethical and sustainable markets in Portugal

Marketplaces in Portugal are gaining ground in an increasingly demanding consumer market. Offline sales do not just depend on the salespeople's competence and persuasion. In the digital environment, consumers are influenced by the attractiveness of the content and the trust that the brand offers. All this depends on good business planning and sales strategies, which imply choosing the appropriate marketplaces for each type of business [63]. These are the 4 most relevant marketplaces in Portugal:

- **OLX,** dedicated to buying and selling used - and new - items by anyone. It encompasses several sectors, from technology to books or articles for the home.
- **eBay,** allows consumers to visualize and add opinions, reviews, or any feedback to certain products. It is an e-commerce platform that focuses on three types of buying and selling: auction, a direct offer to the seller, and immediate purchase.
- **Farfetch,** a luxury fashion online trading company that encompasses a variety of famous brands. It operates in several international markets and has more than 1,200 brands.
- **Dott,** born to be the reference online shopping site in Portugal and is the first 100% Portuguese marketplace. In addition to presenting a good e-commerce experience in Portugal, through the largest national distribution network, it has more than 500 thousand references available, which is equivalent to two hypermarkets.

Other important marketplaces to follow in Portugal are Fnac and Worten Marketplaces. Fnac Marketplace sells cultural and electronic products, originating in France. Worten Marketplace is a Portuguese consumer electronics and entertainment company. In addition to these, one can also consider, as generalist marketplaces, KuantoKusta, which sells appliances, computer items, smartphones and accessories, health, beauty and fashion, home, and decor products, among others. Wook is also worth mentioning, a marketplace where you can find the widest range of books in English, English, French, and Spanish [63].

Regarding ecologically appropriate Portuguese brands, a study was conducted about e-commerce businesses and ethical/sustainable marketplaces and brands in Portugal [64]. Examples of them are the following:

- **Mind the Trash,** an ethical and sustainable marketplace, is the first zero-waste online store in Portugal. It sells a wide variety of products online, such as household products, accessories and candles, hygiene accessories and soaps, oral hygiene products, cosmetics, kitchen utensils, cleaning products, and children's toys.
- **Organii**, the first company in Portugal specializing in organic cosmetics. The company works for a more informed consumer, who always puts their well-being and health first and at the same time prefers the best for the planet, for the people and animals that inhabit it. Products sold range from beauty and hygiene items, essential oils, vegan products and zero waste, among others.

Among the same types of categories, it is possible to highlight other companies, whose characteristics are gathered in Table 6, concerning multi-brand stores and ecological marketplaces [64].

Table 6 - Ethical and sustainable marketplaces in Portugal and their best-selling categories [64].

Marketplace	Best-selling categories
Mind the Trash	Products for the home, bathroom, oral hygiene, cosmetics, and kitchen
Organii	Organic cosmetics, beauty and hygiene items, essential oils, vegan products and zero waste
Organiko	Cosmetics, bathroom items, household items, footwear, decoration, kitchen items, among others.
Pegada Verde	Articles for the home, kitchen, decoration, cleaning, cosmetics, personal and oral hygiene, school supplies, notebooks, camping
Planetiers	Organic farming and gardening, food, health and natural beauty, pets, toys, and games
The Fair Bazaar	Sustainable clothing for women, men, accessories, and beauty

Planetiers intends to open a marketplace to companies and traders operating in the areas of energy and environment. It is a start-up that aims to create an aggregator of companies with environmentally friendly offers, which facilitates the research and identification of sustainable solutions. The company will have a portal for the dissemination of news, events and initiatives that companies have in the environmental and sustainability area.

The Fair Bazaar is another interesting marketplace, as they have a wide range of criteria for brands and their products from artisan-made, eco-friendly, fair trade, organic, recycling, small scale, vegan, and zero waste. They sell sustainable clothing for women and men, accessories, and beauty. Table 7 clarifies the characteristics required by the

marketplace for brands that intend to register in it, and how they must be sustainable and ethical [65].

Table 7 - Ethical and sustainable criteria from Fair Bazaar [66].

Company	Criteria
Artisan made	Items are handcrafted by skilled artisans with traditional manufacturing methods, bringing in a rich cultural heritage
Eco friendly	All items upon manufacturing had a lower negative impact on the environment and are made with easily biodegradable materials
Fair trade	Produced with standards for fairer trade, friendlier to communities and the entire production process
Organic	Items are produced without synthetic chemical inputs, such as fertilizers, pesticides, or GMOs.
Recycling	All the items include recycled materials. Recycling entails converting waste into new materials and objects instead of using our limited natural resources.
Small scale	Items are produced in small quantities, each being better quality controlled and one-of-a-kind.
Vegan	Items reject the use of any kind of animal products or by-products in the making of a product.
Zero waste	Items didn’t generate any trash upon manufacturing.

Regarding recent brands focusing on business with ethical and sustainable principles, it is possible to highlight the ones present in Table 8, according to an online study published in *Ekonomista* [64]. There are fashion brands selling clothing and ecological Portuguese brands selling cosmetics, soaps, decoration, candles, as well as foodstuffs.

Table 8 - Popular ethical and sustainable brands in Portugal [64].

Company	Category
As Portuguesas	Shoes
Balluta	Women's shoes
Bosque Feliz	Sustainable toys and products
Casa do Bosque	Carob chocolates
Cramet	Decoration
Flaska	Reusable bottles
Green Boots	Footwear and clothing
Life in a Bag	Home garden
Mon Père	Second-hand clothing
MUSA Natural Cosmetics	Cosmetics and soap
Nae Vegan Shoes	Shoes
Naturapura	Baby clothes and toys
Näz	Women's clothing
Mushi	Mushroom products
Saponina	Soap shop
Simplu	Granola
SIZ	Women's clothing

Squeez	Reusable packs and meal kits for babies and children
Stró	Home textiles
Tuhkana Swimwear	Biodegradable swimsuits
Yogurt Nest	multi-purpose yogurt maker

In addition, it is prudent to highlight innovations such as Too Good to Go**,** the largest app to combat food waste that arrived in Portugal some time ago. Through the application customers can, for the first time, buy wasted food from restaurants, hotels, and supermarkets, developing a more optimized and conscious consumption that impacts the environment. The company was born in Denmark, is already present in 13 European countries, and has more than 17 million users across Europe. In total, it has 31,000 partner establishments preventing 58,000 tons of CO_2 from being emitted into our atmosphere [66]. The first wholesaler to join the movement in Portugal was Makro.

As a B Corporation, a company that seeks social and environmental development as a business model, Too Good to Go has a knowledge hub where it gathers all the information on food waste, which represents a vast problem in society and is an increasingly common theme. This example was chosen to portray how business strategies with this type of ethical and sustainable principles manage to quickly grow thanks to the growing behavior of consumers in relation to environmental issues [67].

From both surveys carried out, whether in the trends of marketplaces and the future of e-commerce, or in ethical and sustainable markets in the world, and particularly in Portugal, it is necessary to verify that the fashion and clothing industry in footwear and accessories is the biggest trend now in terms of ethical and sustainable markets.

Brands are increasingly concerned about corporate responsibility actions, such as investing in renewable energy systems, fine-tuning processes to spend less energy and water, actively supporting projects and institutions that promote ecological and social sustainability, among other types of activities.

2.6.4. Common selling products and services

In the context of general commerce and electronic purchases, it is important to distinguish the difference between products and services. Some companies only sell products, others that provide services, and many that provide both to their customers. Products, which are tangible materials**,** resulting from human activity, are related to a production process. In economics, durable and non-durable goods are products, items that have an owner, with rights over them. For example, what a store sells what a farm harvests, and what industry produces are products, whether clothes, cars, food, or others. Services are the execution of one or more activities to meet a satisfy a particular

need, such as transport, education, meals, telephone services, etc. A service is consumed while it is being provided and has availability limitations associated with human and material resources and depends upon the customer's participation or presence to happen [68].

A study from Eurostat on online purchases in the year 2020 shows the percentage of individuals who bought or ordered goods/services over the internet for private use in the previous months, as possible to seen in Figure 7 - Percentage of individuals who bought or ordered goods/services over the internet for private use [69].Figure 7 [69].

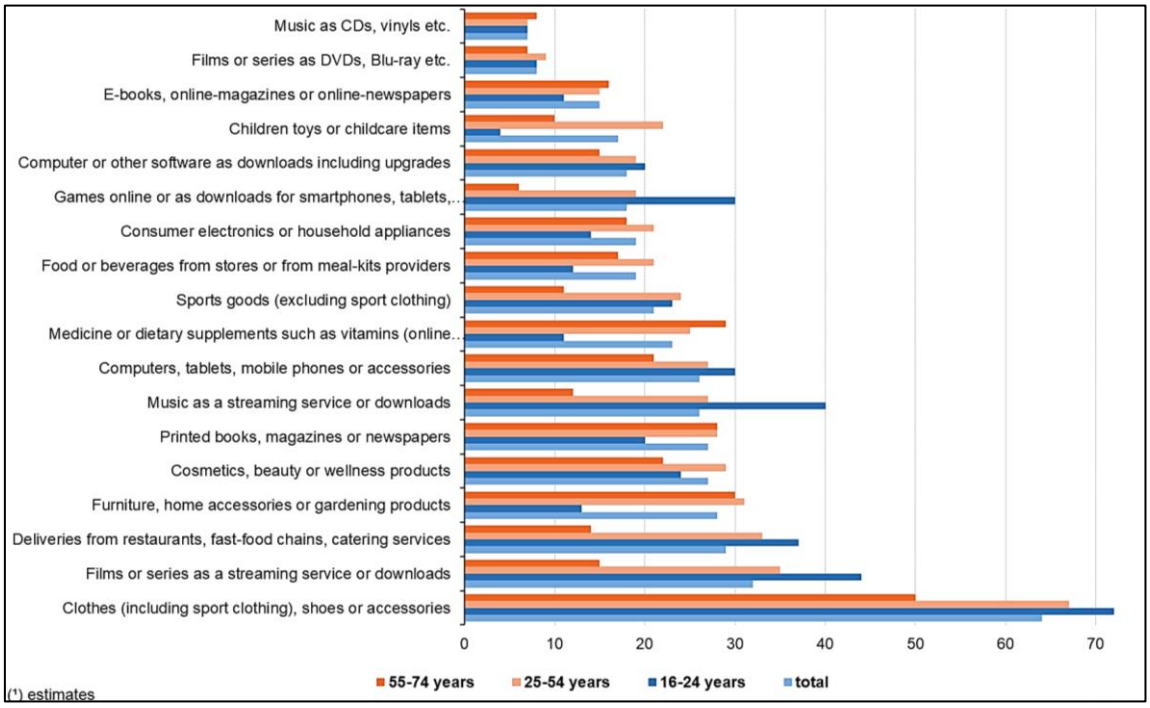


Figure 7 - Percentage of individuals who bought or ordered goods/services over the internet for private use [69].

The survey showed that clothes (including sport clothing), shoes and accessories were the most purchased items, with over 60% of total respondents considering that younger ages, from 16 to 24 and 25 to 54 years had more interest. In second ranks films or series as streaming service or downloads. Food deliveries from restaurants and fast-food chains had the third-highest rank in online purchases in the countries of the European Union.

Considering that a large part of the evaluated ethical and sustainable companies found with investment rounds on the stock exchange are based in the United States, an American study was analyzed through a Consumer Survey from Statista conducted in 2021. The research, with about five thousand respondents from 18-64 years of age, showed that 56% of them choose “Clothing and Fashion” when asked about items

bought online, at the expense of other categories, such as leisure, health, beauty, travel, computers, electronics, amongst others [70].

Both stats conclude that when it comes to products, fashion industry is on the rise (clothing, accessories, and others), particularly in sustainable fashion, and when it comes to services, the delivery of meals to people's homes is a growing sector, whether from restaurants or fast-food chains. The last gains importance in terms of two factors:

- Carbon emissions by the way of transport, and distances associated from which clients choose the company.
- The environmental impact of packaging, since people are willing to buy alternative non-plastic products and packaging, and considering more local products, blending safety and sustainability.

2.7. Environmental impact of products and services

The environmental impact of products and services considered equivalent for the consumer is subjected to comparative and absolute analysis to deepen the subject. The concept of equivalence comes from the necessity to identify the current sectors of the market, where the consumer is mostly looking for sustainable products and services. In this scope, it is acceptable to pay more for products, due to their characteristics, recognizing their equivalence to another type of good within the same category.

As a market trend, there are increasingly more sustainable consumption habits, in which the emerging business of sustainable fashion and transporting of services, such as food delivery, stand out. Transport as a service has a high environmental impact due to emissions and non-ecological and sustainable packaging.

To understand the sustainability of products and services, labelling is crucial. Understanding the environmental labels and initiatives on the performance of products and companies is nowadays a challenge for market actors, consumers, and companies. In the EU, there are more than 200 environmental labels active, and more than 450 worldwide. For carbon emissions only, there are more than 80 widely used reporting initiatives and methods. To avoid greenwashing, the *European Green Deal* stated that “companies making ‘green claims’ should prove these next to a standard methodology to assess their impact on the environment”, and "The 2020 Circular Economy” action plan proposes that companies validate their environmental claims using product and organization environmental footprint methods. Different market actors, from consumers to companies and investors, are allowed to take greener and ethical decisions when confronted with reliable environmental information [71].

OECD presented an overview paper related to counting carbon in the marketplace at the global forum on trade and climate change in 2009. Estimating the total amount of greenhouse gases (GHG) produced during the different stages in the “life cycle” of goods and services gained interest as there is a growing concern over climate change [72].

This life cycle is wide, from production, processing, transportation, sale, use and disposal. Product carbon footprints (PCFs) vary with the GHG assessments performed at the level of projects, corporations, supply chains, municipalities, nations, or individuals.

Surveys in several OECD countries suggest that consumers are increasingly interested in information about the climate impact of products. Retailers and manufacturers responded to sustainable trends in consumer interests and behavior by calculating and displaying carbon footprints for a small number of products. In most cases these initiatives were not launched with the primary purpose of increasing market share of the product itself through improved differentiation, but more as part of a general effort to demonstrate commitment to climate-change mitigation to consumers, and to lawmakers planning to introduce strict regulatory measures (e.g., in the UK), or as part of broader corporate social responsibility policies. Nowadays, as sustainability is also a market trend, increasing market share by displaying reliable environmental information is accurate [72].

A report from the European Commission of July 2014 point to a situation where environmental claims have compliance problems with criteria developed by UCPD, the Unfair Commercial Practices Directive, that regulates unfair commercial practices in EU law. Besides, some environmental claims could be considered misleading, untruthful, or inaccurate. Furthermore, the substantiation of claims is a common problem and requires further clarification [73].

For analysis at company level, 80 leading methodologies and initiatives were identified according to which GHG reporting could be carried out. GHG protocol has a comprehensive cross-sector calculation tool, setting the standards to measure and manage emissions of greenhouse gases. It provides the world’s most widely used greenhouse gas accounting standards for companies, organizations, countries, and cities, helping them track progress toward climate goals [74].

Financially, carbon reduction activities generate positive returns on investment, averaging 33%, well more than cost of capital (typically 8-12%). Furthermore, it was found out that 26% of EU citizens often buy environmentally friendly products, 54% of them sometimes do, and 39% of consumers say business claims about the environment are not accurate [50]. The last aspect is important as consumers do not always recognize the ethical and sustainable validity of products and services on the market.

Credibility of environmental claims and even labels need to be improved, as 48% of consumers say current environmental labels are not clear, and only 6% of EU citizens trust producers' claims about their product's environmental performance completely. In addition, more than 1/3 of 250 business executives said that they could not keep up with consumer demand for sustainable products and services and 62% declared that sustainable investments were motivated by consumer expectations for green products [50].

These considerations allow us to conclude that there is interest on the part of investors and customers. However, customers need to be better informed and integrated into the process of choosing and purchasing products and services, so that they become willing to pay more for sustainable products and services.

Addressing the threat of climate change requires a major shift in allocation of financial resources. The European Commission estimates that at least 180 billion euros of additional investments per year are needed during the next decade for the EU to reach its climate targets. There must be a change in financial regulation to redirect private financial flows, from brown to green activities, defining a strategy by completing the Capital Markets Union to ensure SMEs have access to the fundings to grow, innovate, and scale up [75].

A consistent "EU Ecolabel" for the greenest financial product should be completed to ensure that investment products are labelled according to their degree of sustainability (and notably their degree of alignment with the climate Paris agreement). In addition, retail investors should be asked about their sustainability preferences by financial advisers and be offered adequate financial products that match their preferences and demonstrate positive impact while avoiding misleading claims. This will mean reopening several regulations to ensure a consistent European approach with harmonized indicators and to develop a robust, granular framework to prevent greenwashing and measure the sustainability impacts of funds [76].

2.7.1. Fashion products

Currently, the fashion industry is not environmentally sustainable, thus companies have begun applying circular business programs to appeal to conscious consumers and cut back on their carbon footprint. However, a new study shows that these models may only benefit higher-priced players (exclusive markets), leaving value markets in the dust [77].

Reports from Accenture Strategy, and Fashion for Good, a platform for sustainable fashion innovation, dating 2019, found that circular business models prove to be most profitable for higher-priced markets across the board, although mid-level and

premium markets could benefit as well. For luxury markets, all circular models are profitable on a per-garment basis, with the most notable being the rental segment (61%), followed by recommence, the recovery and resale of garment by the original retailer (39%), and subscription rental (30%) [77].

A 2019 report from online resale marketplace ThredUp concluded that 96% of senior retail executives surveyed want to advance their company's circular fashion efforts by the end of 2020. Retailers are aware of consumers' desires to be more environmentally conscious, and those who choose to implement a circular business model should consider not only their product offering but also how it fits into the fashion ecosystem [77].

Work has been made on identifying ways in which the broader textile, clothing, and fashion industry could move towards a holistic commitment to climate action. The Fashion Industry Charter for Climate Action, launched in 2018 by fashion stakeholders, presents a pathway into decarbonizing the fashion industry. The Fashion Industry Charter for Climate Action, with its working groups, identifies, and amplifies best practices, strengthens existing efforts, addresses gaps, and facilitates collaboration among relevant stakeholders, joining resources and sharing tools to enable the sector to achieve its climate targets. This UN project includes fields such as decarbonization pathways, GHG emission reductions, raw material, manufacturing/energy, logistics, policy engagement, leveraging existing tools and initiatives, promoting broader climate action, and brand/retailer-owned or operated emissions [78].

Although consumers become more socially conscious in their shopping habits, the practice of fast fashion is notoriously unsustainable. Fast fashion is the mass-producing trend-inspired clothing at inexpensive rates, which contributes to textile manufacturing pollution and encourages consumers to buy and discard clothes as quickly as trends change [79].

According to an article from Forbes, despite growing consumer interest and activity, the sustainable fashion market is still young and fragmented, being difficult for shoppers to locate brands aligned with their values. This is essentially due to the need to properly classify products and services in terms of their sustainable characteristics [80].

As we can see from Figure 8, a previous study, made between 2017 and 2022 shows that the total online fashion retail sales are expected to grow from $484 billion to $765 billion between 2018 and 2022. Besides, the e-commerce share of total fashion sales is expected to grow from 27% to 38% in the same period, recognizing the importance of this sector to the world economy [81].

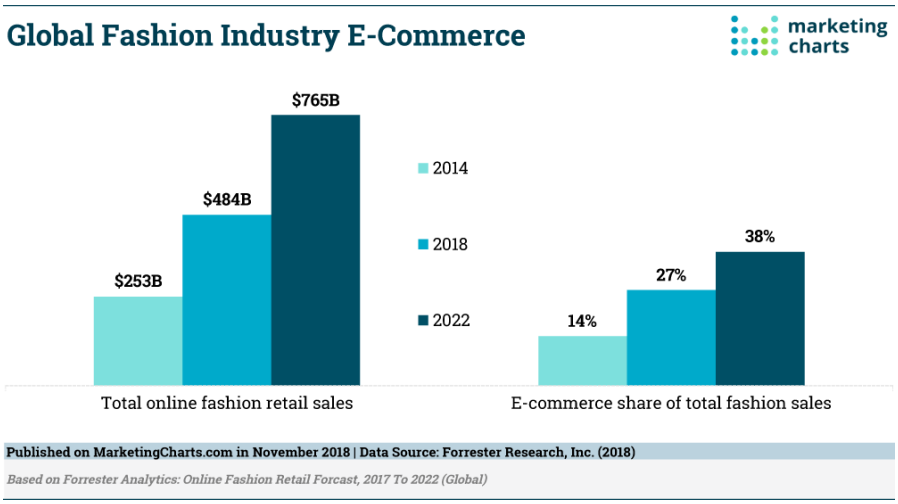


Figure 8 - Online global fashion retail forecast between 2017 and 2022 [81].

One of the major polluting industries in the world is the fashion industry. Producing and distributing the crops, fibers, and garments employed in fashion causes several forms of environmental pollution, including water, air, and soil pollution. The textile industry is the second greatest polluter of local freshwater in the world and is responsible for nearly one-fifth of all industrial water pollution. Fashion production makes for up to 10% of humanity's carbon emissions, dries up water sources, and pollutes rivers and streams [82]. The production overrun of fashion items, the use of synthetic fibers, and the agriculture pollution of fashion crops are some of the main factors that contribute to the problem.

The main concern with fast fashion is the clothes waste it produces. According to the Environmental Protection Agency, 15.1 million tons of textile clothing waste was produced in 2013 alone [83]. When textile clothing ends up in landfills, the chemicals on the clothes, such as the dye, can cause environmental damage by leaching the chemicals into the ground. The excess waste also contributes to the issue of using so many sites just to store waste and garbage. When unsold clothes are burned, it releases CO_2 into the atmosphere. As per a World Resources Institute report, 1.2 billion tons of CO_2 is released in the atmosphere per year by the fast fashion industry [84].

2.7.2. Transport services and Eco-design

About 95% of today's transport is dependent on fossil fuels [85]. The consequences — air pollution and climate change — lead to negative impacts on the environment, health, and quality of life.

In Germany, for instance, around 20% of direct CO_2 emissions are attributed to transport, with street traffic causing about 95% of those emissions [85]. Sustainable transport policy must therefore aim to significantly improve the balance between the

growing need for mobility and the requirements of health and the environment. This entails reducing pollutant emissions, noise and the use of land and resources.

In the United States, the transportation sector generates the largest share of greenhouse gas emissions [86]. Greenhouse gas emissions from transportation primarily come from burning fossil fuel for our cars, trucks, ships, trains, and planes, representing 29% of all greenhouse gas emissions in 2019, as can be seen in Figure 9.

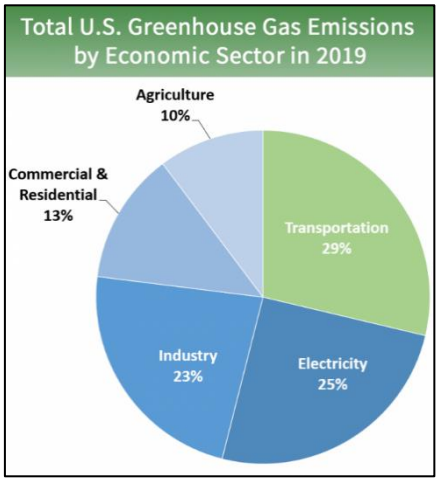


Figure 9 - Total US Greenhouse gas emissions by economic sector in 2019 [86].

According to a report from the *European Commission* about the contribution of transport to GHG emissions, transport is responsible for around a quarter of EU greenhouse gas emissions, making it the second biggest greenhouse gas emitting sector after energy. The increasing political importance that is being attached to decarbonizing transport reflects the fact that, of all the economic sectors, transport has proved to be one of the most problematic in terms of reducing its GHG emissions. GHG emissions from transport are predicted to continue to increase, without additional measures, to over 2,000 Mt CO_2 by 2050. Transport is responsible for nearly 30% of the EU's total CO_2 emissions, of which 72% comes from road transportation. As part of the efforts to reduce CO_2 emissions, the EU has set a goal of reducing emissions from transport by 60% in 2050, when compared to 1990 levels [87].

Figure 10 shows to the evolution of CO_2 emissions in the European Union by sector between 1990 and 2016, an analysis from the European Environment Agency. It is possible to see how transport has been increasing its CO_2 emissions between 1990 and 2016. Other sectors cut emissions since 1990, but as more people become more mobile, CO_2 emissions from transport increase [88].

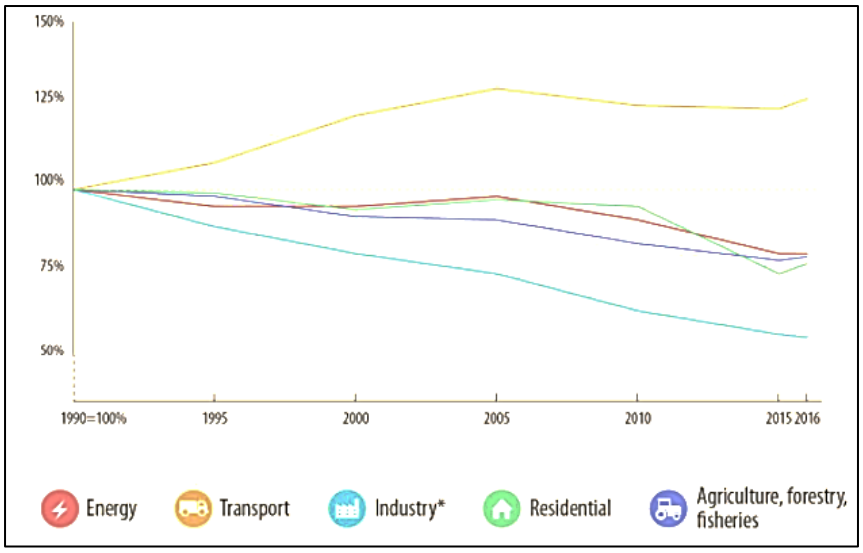


Figure 10 - Evolution of CO_2 emissions in EU by sector (1990-2016) [88].

Regarding packaging in transport services, the old "*buy-use-drop"* paradigm of linear economics has become obsolete and leads society to an uncertain future. It is in this context that eco-design is born, sustainable products that include ecological criteria in all its stages: conception, development, transport, and recycling [89].

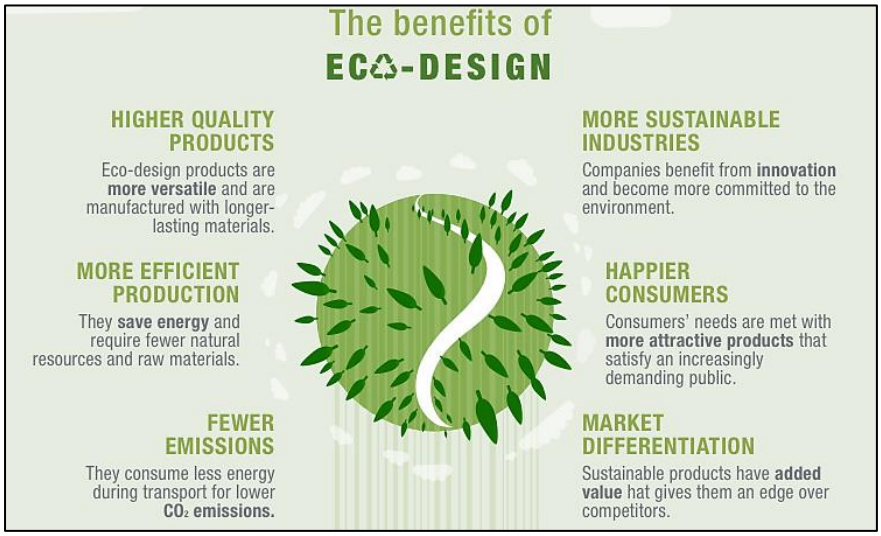


Figure 11 - Illustration representing the benefits of eco-design [89].

Figure 11 states the benefits of eco-design and how it can be accomplished. Eco-design is a new philosophy that considers product sustainability from start to finish, where extraction, manufacturing, distribution, and consumer use must all adhere to green criteria [89].

This methodology is a key factor for the circular economy, and a strategic point to give products and services sustainable adaptations, looking at a waste-free circuit and net zero emissions [89]. Designing with sustainable materials means that the goods in

the circular economy reach the end of their useful life in a suitable condition to be put to new uses, unlike the buy-use-throw away or 'linear' economy.

There must be a better and more efficient production as raw materials and natural resources are not infinite, thus run out. Some of them, such as water, are essential for life, while fundamental sectors of the economy, such as the technology industry, depend on minerals.

According to Greenpeace, society is using 50% more natural resources than 30 years ago. Due to the consequences of consumerism, the UN is demanding a new production model that optimizes resources and energy, develops sustainable infrastructure, improves access to basic services and creates ecological and quality jobs [90].

The environmental benefits of sustainable production also affect industry and citizens. The UN argues that this system is good for everyone because it improves the quality of life for millions of people, reduces poverty, increases competitiveness, and reduces economic, environmental, and social costs [89].

2.8. Willingness to Pay

After the study carried out above, we were able to understand that it makes sense to choose a fashion product and a transport service to apply in the experience of measuring people's willingness to pay. In this sense, we now highlight the meaning of this type of experiences, the most common types, and the way in which the study was taken, to assess the WTP of products and services in a sustainable marketplace. Although there is a growing awareness that it is necessary to consume in a more responsible and environmentally friendly way, it is noteworthy that consumers are not always consistent between what they say and what they do. WTP measurement allows us to see whether people are willing or not to pay more for a particular sustainable product or service.

2.8.1. Behavioral and Experimental Economics

Behavioral economics studies the effect of psychological, cognitive, emotional, cultural, and social factors on the decision of individuals and institutions. It is primarily concerned with the limits of rationality of economic agents [91]. By evaluating the influence of sustainable and/or ethical information to the consumer, it is possible to understand decision-making processes, and the significance of the value of sustainability attributes.

In this vein, Willingness to Pay is the maximum price at or below which a consumer will buy one unit of a product [92]. This corresponds to the standard economic view of a consumer reservation price, a limit on the price of a good or a service. On the demand side, it is the highest price that a buyer is willing to pay. On the supply side, it is the lowest price a seller is willing to accept for a good or service. Some researchers, however, conceptualize WTP as a range [92].

Consumer willingness to pay is a context-sensitive construct. For example, consumers tend to be willing to pay more for a soft drink in a luxury hotel resort or in a beach bar than in a local retail store. This goes to show how a consumer's WTP for a product depends on the concrete decision context [93]. This way we can anticipate that the context is quite important. In other words, the mandatory aspects of product and service sustainability must be very clear for the experience to be well founded.

Experimental economics is the application of experimental methods to the study of economics. Experiments are used to test the validity of economic theories and to explore new market mechanisms. Using individuals motivated by money, economic experiments create real incentives to help understand how markets and other exchange systems work [94]. These types of experiments would require incentive-aligned methods, as explained in the next chapter. However, a simpler approach was conducted, regarding finding out how behavioral aspects result in willingness to pay.

2.8.2. Methods for evaluating the willingness to pay

Decision-making process of consumers depends on various contextual factors, from their perceptions of the product to their knowledge and its manufacturer. Willingness to pay can vary significantly from customer to customer, depending on differences in the customer population, typically classified as either extrinsic or intrinsic. Extrinsic differences are customer’s age, gender, income, education, and where they live. Intrinsic differences are a person's characteristics as risk tolerance, desire to fit in with others, and level of passion about a given subject. Furthermore, customers' willingness to pay for products or services isn’t static and several factors can cause a customer’s willingness to pay to rise or fall [93].

By determining the customers’ willingness to pay, a company can set its prices at a level that allows it to maximize profits and customer satisfaction. Accurately assessing consumers’ willingness to pay for a product or service is critical for formulating competitive strategies and developing new products. It is also important for the implementation of various pricing tactics, such as non-linear pricing, personalized pricing, and targeted promotions [95].

There are many methods for measuring WTP, which differ whether WTP is measured directly or indirectly and whether it is regarding the consumer's hypothetical or actual WTP. Also, existing market research techniques for measuring WTP differ in if they provide an incentive to consumers to reveal their true WTP and in whether they simulate actual point-of-purchase contexts [96].

For being more practical, some researchers prefer direct approaches, asking consumers directly for their WTP for a specific product or service. This is called an open-ended question format. In opposition, there are closed-ended questions, for which a researcher provides participants with options from which they need to choose a response. A direct approach for obtaining the actual WTP is the Becker-DeGroot-Marschak (BDM) method, in which a participant is required to purchase a product if the price drawn in the lottery is less than or equal to his declared WTP [94].

Alternatively, there are indirect approaches, such as Choice-based Conjoint Analysis (CBC), in which WTP is calculated based on consumer choices between various product alternatives and a "none" option. However, neither method is failsafe. Various investigations have demonstrated that direct and indirect approaches can produce erroneous results for a variety of psychological and technical reasons. More fundamentally, both approaches measure the hypothetical WTP of consumers, instead of the real one, and therefore can generate hypothetical bias, which the economic literature defines as the bias induced by the hypothetical nature of a task [92].

An indirect approach to determining the actual WTP is the incentive-aligned choice-based conjoint analysis (ICBC), in which participants are also required to make a purchase based on their preferred inferred WTP, like the BDM method. With more realistic economic incentives for respondents, these two approaches have yielded good results in some applications. However, an actual WTP generated with these methods may not always be accurate, because it may be different from the WTP shown in actual consumer purchases [92].

Once a product is on the market, consumers' willingness to pay can be estimated based on market transaction data, for example by the hedonic method. However, in the context of the development of new or improved products, there is the need to use methods to estimate WTP where no market transaction data is available [97].

There are mainly three types of methods proposed in the literature, and they are the following:

- Contingent valuation (CV) - a survey-based approach where respondents are asked directly whether they would be willing to pay a certain price for a product, or whether they are willing to pay a certain additional price for a certain product improvement. The CV method has been especially popular for estimating WTP

in cases where market prices do not exist. However, the answers are hypothetical and there is little incentive for consumers to honestly reveal their willingness to pay [98].

- Experimental auctions - a class of procedures where participants bid for a product or an improved product. It is widely used in experimental economics [99].
- Conjoint analysis - the most popular way of addressing willingness to pay issues in the marketing area. Respondents are presented with several product descriptions (product profiles) that have been generated from an underlying factorial design of product attributes and attribute values. Respondents must then rank or rate the various product profiles. Conjoint analysis would require a hedonic regression, which is a revealed preference method of estimating the demand for a good, or equivalently its value to consumers. It breaks down the item being researched into its constituent characteristics and obtains estimates of the contributory value of each characteristic [100].

2.8.3. Previous Studies

Bearing in mind that the focus is on the assessment of the willingness to pay more for sustainable products and services, a value considered as a “green premium”, some articles that were considered interesting to serve as a point of comparison in the experience to be carried out will be highlighted. In the past decade a huge number of studies have explored consumers’ willingness to pay across different product categories. However, the intention to pay the premium for green products had remained unexamined to a large extent [101].

A study about willingness to pay more for green products evaluated the interplay of customer characteristics and customer participation (CP). Sustainability-oriented firms should create more engagement opportunities by designing the production and delivery process in ways that more CP and involvement is allowed. It concluded that the more a consumer understands environmental issues and eco-friendly products, the more likely he or she believes that his or her actions can make a difference in solving environmental problems, and the higher likelihood that he will be willing to pay more for green products. Also, consumers who lack environmental motivation are unlikely to pay more for green products, which is consistent with previous literature. Interestingly, as hypothesized in the study, they found that an initial unwillingness is mitigated by a high level of customer participation [102]. This goes to show, as a guideline for the survey experiment of this thesis, that involving the consumer in the purchase process through information concerning sustainable products and services can contribute to increasing the WTP.

In terms of the results of the different methods, a study from Denmark compared methods for measuring willingness to pay for a basic and an improved readymade soup product. The results showed no differences between the use of contingent valuation and experimental auction, and that conjoint analysis led to lower WTP estimates for the product improvement than the two other methods [97].

There is currently limited research dedicated to understanding customers and acceptance of circular business models [103]. A study from Sweden searched on how customers are willing to pay for products according to different levels of circularity. An online survey experiment tested whether customers are willing to pay more for products with a theoretical multi-level circular economy score. Conjoint analysis was used on 800 respondents in the United Kingdom to test their willingness to pay for mobile phones and robot vacuum cleaners at different levels of circularity alongside other product attribute combinations. Results indicate that the average customer mostly prefers a more "circular" product when compared to products with otherwise identical attributes and that customers are consistently willing to pay more for products with low or moderate levels of circular content. However, analysis suggests that willingness to pay more for products disappears, and in some cases declines, as the proportion of recirculated content increases. Results offer evidence that applying a numerical circular economy label at low levels of recirculated content could be a profitable strategy for producers of mobile phones and robot vacuum cleaners. Such a strategy is less certain for heavily refurbished products, fully reused products, or other product types [104]. This goes to show as people still doubt the quality of green products, and therefore clear statements must be employed when nurturing the experience, regarding the survey experience carried out in this thesis.

A different work used an experimental auction approach to measure willingness-to-Pay for Eco-Labelled Forest Products in Northern Ireland. The work concluded that customers are willing to pay more for eco-labeled forest products and that eco-labels allow producers of forest products to differentiate themselves in the market or enter new markets entirely. The positive willingness to pay is related to the consumers' knowledge of the environment, their conservation-orientated beliefs, and higher levels of education [105]. Thus, it is possible to induce that higher levels of eco-literacy, education, and sustainable beliefs can positively affect the willingness to pay. Particularly, the level of education stands out as an important factor that increases the intention to purchase eco-friendly products, as it was drawn from a study on willingness to pay for eco-friendly furniture based on demographic factors [106].

From a more specific point of view, it was tried to find out papers that show how much are people willing to pay price premiums for sustainable products and services. Most

studies revealed a WTP range between 10 to 25% above the original value. As a service example, a study on Consumers' willingness to pay for green initiatives of the hotel industry showed that guests are willing to pay up to 10% more to stay at a hotel that is making efforts to be environmentally sustainable [107].

As products examples, for organic fruits and vegetables in Ghana, a willingness to pay between 15% and 20% was denoted. In a different context, it was found out a willingness to pay 10% more for environmentally certified wood products in the US [106]. Also, in agreement with the importance of sustainable fashion in modern days, a study showed that European customers are willing to pay up to 25% more for a sustainable t-shirt [108]. The results suggest that shoppers are willing to spend more on sustainable clothing but with limitations, signaling a lack of awareness around the costs involved. This way, brands wanting to sell their sustainable collections may need to do work on educating the public on the environmental impact of clothing [108].

2.8.4. Green Premiums

On the verge of environmental deterioration, the adoption of environment-friendly practices, including the consumption of greener products or services, depends on customers' inclination to pay the green price premium. According to GatesNotes, understanding questions such as "Which clean sources are effective enough and cheap enough now, and which ones aren't yet?" will help society apply its best minds and resources on climate and energy problems. The problem can be summed as: What is the difference in cost between a product that involves emitting carbon and an alternative that doesn't? The difference in this cost can be called Green Premium [109].

As can be seen in Figure 12, the green premium is the additional cost of choosing a clean technology over one that emits a greater amount of greenhouse gases, therefore translating into a lower environmental impact. Currently, clean solutions are usually more expensive than high-emissions ones, though this is caused by the lack of consideration of the true economic and environmental costs of existing energy options like fossil fuels into the price [110].

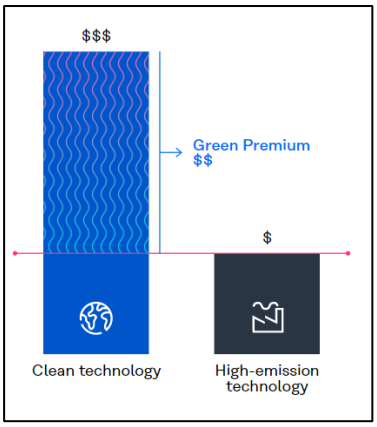


Figure 12 - Illustration of a green premium, the additional cost (above the red line) that a clean product can take [110].

Here's an example of a green premium: The average retail price for a gallon of jet fuel in the United States over the past few years has been around $2.22, while advanced biofuels for jets cost around $5.35 per gallon. The green premium is the difference between the two, which is $3.13, or an increase of more than 140 percent [109]. This example goes to show how difficult it is to manage some productive systems or goods that are already deeply rooted in our society and are therefore difficult targets for change to more sustainable conditions.

Considering the last example, on the one hand, airlines would not be willing to pay more than twice as much to fuel their planes; on the other hand, many customers would not like the increasing result in airline tariffs. This way, the green premium on biofuels suggests that we need to find ways to either make them cheaper or make jet fuel more expensive or a combination of both [109].

Another example is with gasoline, as possible to interpret from Figure 13. The average retail price in the United States over the past few years was $2.43 per gallon. Electrofuels cost around $8.20 per gallon. The Green Premium for low-carbon fuel is the difference between the two prices or $5.77 – which means the clean choice is more than three times as expensive as the current greenhouse gas emitting option [110].

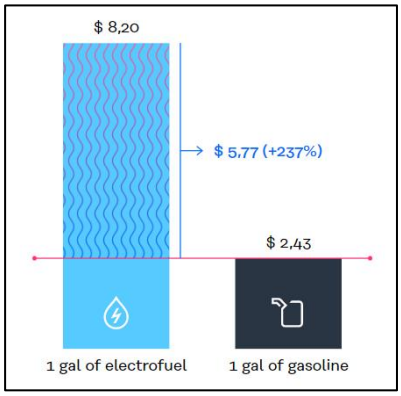


Figure 13 - Illustration of an example of a green premium product in the US [110].

Calculating green premiums involves making assumptions about the cost of emerging technologies. In cases where the green premiums have a high value, it is necessary to look for innovations that will close the price gap. In cases where they're small, or when clean products are cheaper than the polluting version, something other than the cost is keeping the sustainable alternative from being deployed, so there is the need to understand why and how to change that. For instance, although meat-free burgers still typically cost more than beef, and low carbon cement or steel cost more to produce than their greenhouse gas emitting equivalents, sometimes, the green premium is negative, which means that going green is already cheaper than sticking with fossil fuels. For example, depending on where one lives, it can be cheaper to replace the natural gas HVAC system with an electric heat pump [109].

The green premium gives part of the road map to zero carbon emissions. It helps to see what technologies should be scaled up now and where more breakthroughs are necessary. In addition, it helps entrepreneurs, policymakers, and decision-makers to think about their priorities. According to GatesNotes, there are three levers we can pull to reduce Green Premiums:

- Governments can use policies to either make the carbon-based version of something more expensive or make them clean version cheaper or even, ideally, some of both. This could include requiring a certain amount of electricity or fuel to be generated in zero-carbon ways.
- Companies and investors can commit to buying and using cleaner alternatives, investing in research and development, supporting clean-energy entrepreneurs and startups, and advocating for helpful government policies.
- Individuals can help create markets for better, cleaner alternatives. When an electric vehicle or a plant-based burger is bought even though it costs more than the alternative, it is possible to transmit to the companies that make these products: "There's demand for these items. Make more and we'll buy them." This will drive investment in research, which helps decrease the price and ultimately makes clean products more affordable and available for everyone.

A study from *Harvard Law School on Corporate Governance*, dating May 2020, about carbon premiums — the return that compensates investors for taking on the transition risk — around the World, investigated on how the growing awareness about climate change and the different climate policy stances across countries are reflected in financial markets [111]. They observed how stock returns in 77 countries for more than 14,000 publicly listed companies are affected by the risk associated with carbon emissions.

The study also explored which factors carbon premiums are associated with, across countries, industries, and firms, and discovered several interesting patterns in the data. First, the level of economic development does not explain cross-country variations in the carbon premium. Second, more democratic countries with a stronger rule of law tend to have lower carbon premiums. Also, the carbon premium is lower in countries with a higher share of renewable energy, and higher in countries with larger oil, gas, and coal extracting sectors. Carbon premium is also higher in countries that have been exposed to greater damages from climate disasters, showing how these events tend to raise awareness about climate change [111].

Also, it is possible to understand how investors have only recently become aware of the urgency of climate change, as when the researchers pooled all countries together, found that there was no significant premium before the Paris agreement, but a highly significant and large premium in the years following the agreement [111]. This analysis goes to show how policymakers can interfere with markets in terms of sustainable and green investments, and how carbon premiums are being increasingly recognized in the market.

2.8.5. WTP for green premiums

By estimating WTP and working backward to determine the price, companies can confidently maximize profit margin while capturing as much value as possible from the consumer. From all the methods analyzed, it would be possible to use conjoint analysis; however, designing conjoint studies can be complicated, requires complex software, thus a survey was made.

Surveys and focus groups are one of the ways of determining the customer's willingness to pay by asking them. Surveys typically collect a large amount of quantifiable data, while focus groups often result in more nuanced and qualitative information. However, relying on surveys and focus groups requires that they are designed in a way that encourages respondents to answer truthfully [93]. By reviewing the literature regarding methods for assessing willingness to pay, two methods of data analysis (both direct approaches) were underlined, according to the objectives of the present study:

- The Contingent Valuation, through which the respondents answer directly to the question of how much they would be willing to pay for the new version of the product or service, includes sustainable characteristics. This is considered a direct approach, as an open-ended question format, asking consumers directly for their WTP, revealing the additional price for a certain product or service sustainably referenced improvements [92].

- The Van Westendorp price sensitivity meter (PSM). Introduced in 1976 by Dutch economist Peter van Westendorp, the technique has been used by a large variety of researchers in the market research industry. The price sensitivity meter is a pricing method where respondents are asked a series of questions to identify psychological price points. Van Westendorp pricing questions are advanced question types used in online surveys to create a better pricing strategy, and its approach has been a prime technique for addressing pricing issues for the past 20 years [112].

The traditional PSM approach asks four price-related questions, which are then evaluated as a series of four cumulative distributions, one distribution for each question [113]. The standard question formats can vary, but generally take the following form:

- At what price would you consider the product to be so expensive that you would not consider buying it? (Too expensive)
- At what price would you consider the product to be priced so low that you would feel the quality couldn't be very good? (Too cheap)
- At what price would you consider the product starting to get expensive, so that it is not out of the question, but you would have to give some thought to buying it? (Expensive/High Side/Not cheap)
- At what price would you consider the product to be a bargain—a great buy for the money? (Cheap/Good Value/Not expensive)

According to the PSM methodology, by crossing the cumulative frequencies for each of the four price categories, it is possible to obtain interpretive traits. The standard method requires that two of the four cumulative frequencies, which must be inverted to have the possibility of four intersecting points. One way to do that, being the most used form in its general application, is to invert the cumulative frequencies for "too cheap" and "cheap/good value" [112].

Figure 14 represents the application of the price sensitivity meter. The crossing of "too cheap" and "expensive/not cheap" is defined, according to the method, as the lower bound of an acceptable price range, that is, the "point of marginal cheapness (PMC). This point matches the price point where sales would be negatively impacted, due to the customer's perceived lack of quality concerning the value derived from it. A product should not become cheaper than this price [114].

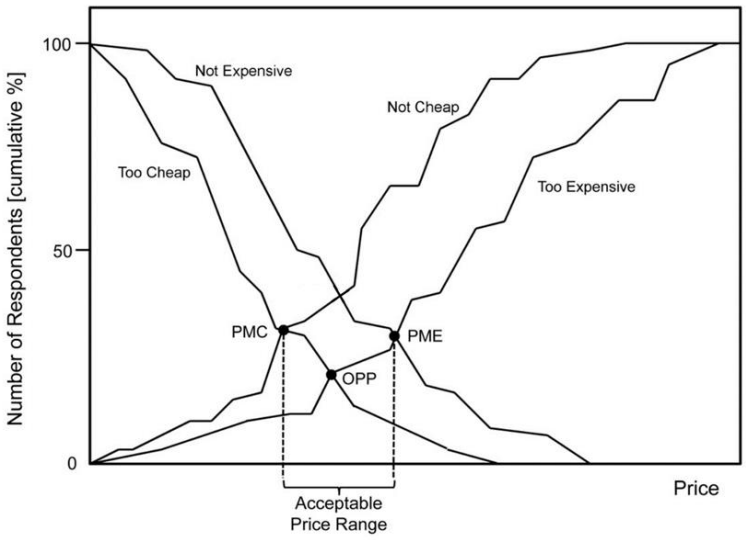


Figure 14 - Price sensitivity meter from Van Westendorp [114].

The intersection of “too expensive” and “cheap” (not expensive) lines can be considered as the upper bound of an acceptable price range, that is**,** the "point of marginal expensiveness" (PME). This point corresponds to the price point where cost becomes a major concern, and where customers often feel that the price of the product/service outweighs the benefit [112]. If a product becomes more expensive than the price at the point of intersection, then the probability that consumers will accept the price and buy the product is very low. This results in lower sales figures and possibly a loss of reputation [114].

The point at which the "expensive" line crosses the "cheap" line is one of the intersections where there is generally more agreement in terms of results validity. This is described as the "indifference price point" (IPP). This point corresponds to the price at which an equal number of respondents rate the price point as either "cheap" or "expensive". It is the point where the same percentage of customers feel that the product is too expensive and those who think it is at a good price. It is here that the greatest number of customers are indifferent to price [115].

Finally, the intersection of the "too cheap" and "too expensive" lines represents an "optimal price point" (OPP). This is the point at which an equal number of respondents describe the price as exceeding either their upper or lower limits [115]. Optimal in this sense refers to the fact that there is an equal trade-off in extreme sensitivities to the price at both ends of the price spectrum.

Both these methods, either the contingent valuation (CV) or the Price Sensitivity Meter (PSM), are practical and noteworthy, to obtain results that can give a sustained idea as a starting point for subsequent studies. Other methods were not used due to their

impracticality, either because of the assessment format that could not gather respondents, or because of the product and service design in question.

It was necessary to use a simple methodology, with a direct approach, to focus on how people, evaluate the product and service, regarding environmental labels, greenhouse gas emissions, and other characteristics, and how it stands out in the consumer's willingness to pay.

3. Methodology

The main hypothesis to be validated is whether, in the context of *MyGreenApp,* customers are willing to pay more for sustainable products and services, and what is the price that consumers would be willing to pay, as a percentage and absolute price value, concerning reference values.

The methodology presented in this chapter represents the experience carried out, through an online survey. To validate and test this hypothesis, experiences that relate the price and environmental impact of products and services in the context of *MyGreenApp's* "Sustainable Marketplace" were made, to determine if consumers are available to pay more for sustainable products and services.

The main goal of the present work is to answer the following research questions:

1. Are people willing to pay more for green products and services sold in an e-marketplace? If so, how much?d

2. What are the demographics of people who are willing to pay more for green products?

We conducted an online survey to assess not only people's willingness to pay more for sustainable products and services but also to measure other parameters and allow for a more extended questionnaire at an early stage. Tally platform was chosen once it is free, simple, visually attractive, and has many practical features.

3.1. Research Approach

The research approach was based upon the idea that consumers might be willing to pay more for products and services that are common in the sustainable and ethical market context. Considering the most sold products and services, and those which have a greater impact on the environment, it was decided to focus on the clothing sector and the mobility and food transport sector. The research approach was considered among the data collection and the data analysis (see Figure 15) [116].

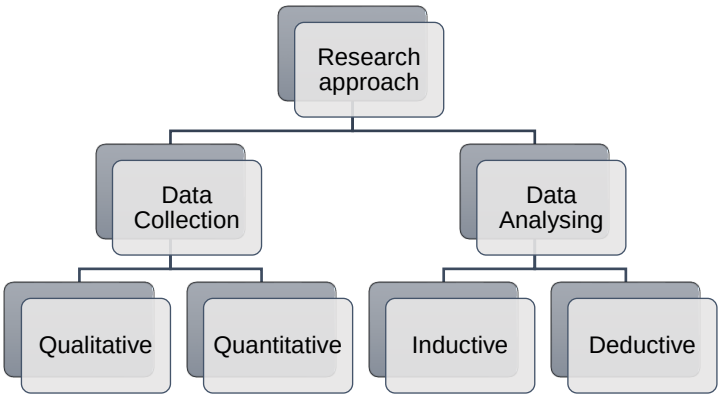


Figure 15 - Research approach methodology [118].

Approach to data collection

In terms of data collection, both quantitative and qualitative research was made [117]. The quantitative data, the one in numerical form, was collected and converted so that statistical calculations and conclusions could be drawn. The qualitative data, which does not involve numerical data, provides insights into the research problem. It is expressed by open-ended questions so that practical results and conclusions could be interpreted, either relevant in the questionnaire or crucial to the marketplace context.

Approach to data analysis

According to Saunders et al. (2016), a research study is either going to test an existing theory or to develop a new theory. If the study is adopting a clear theoretical position that will be tested through the collection of data, the study will be driven by theory and thus have a deductive approach on the matter. On the contrary, if the study aims to explore a chosen topic, and wishes to develop a theoretical explanation with the collection and analysis of data, the research study will be driven by the data and thus have an inductive approach [118].

Due to the purpose of this research study, which aims to explore existing theory but not test it, it will have a mix of deductive approach and inductive approach. It will be deductive in terms of the collection of previous research, which sheds light on the execution of the survey experience. However, it will have inductive elements because the aim is to collect data that will allow us to infer whether customers are willing to pay more for green products, as well as the determinants to that choice (demographics, e-commerce habits, eco-literacy, etc.).

An important factor to highlight is the limitations of the study. In this survey, we will only work based on consumer (customer) behavior through the price of sustainable products and services. However, within the scope of MyGreenApp being able to involve B2B businesses, the survey could also be done, by directing it to the suppliers of industrial goods, among others. For a fact, from the several economic agents in the market, any autonomous entity capable of carrying out economic operations and holding economic value could be integrated with MyGreenApp stakeholders, being that its main goal. Considering that the heterogeneity of economic agents could influence results when mixed, it was decided to survey only one category, that is, final consumers, whose main goal is the consumption of goods and services. B2B would stand out among companies and/or other institutions.

3.2. Research Strategy

The research strategy and design refer to the plan utilized to carry out research, defining a succinct and logical plan to tackle established research questions through the collection, interpretation, analysis, and discussion of data [119]. Research strategy provides the overall direction of the research. Case studies, experiments, surveys, action research, grounded theory, and ethnography are all examples of research strategies.

There are several types of research strategies. When organizing for a research study, the first methodological choice that must be made is the strategy method [120]. Along with the work of this thesis, it was understood as relevant to evaluate different aspects to obtain a concrete analysis of willingness to pay. Fundamentally, this research is considered as a quantitative research strategy once it involves the collection of numerical data for measuring willingness to pay. However, it also has a qualitative research strategy, by collecting non-numerical data, which is useful when the researcher wants to understand the underlying reasons or the opinion of the respondents about the topic.

Also, the study had descriptive research and an exploratory research strategy [120]. The first, once it was tried to find out a behavior pattern of the groups of respondents concerning their e-commerce habits, willingness to pay, and eco-literacy. The second, exploratory research, was used to investigate a problem that is not clearly defined, as it is the context of sustainable products and services and willingness to pay in online markets.

Research strategy helps a researcher choose the right data collection and the analysis procedure. Thus, it is of utmost importance to choose the right strategy while conducting the research. The main components of a research strategy include the research design, research method and sampling strategy [121].

The research design was differentiated by measuring demographics, income questions, e-commerce habits, eco-literacy, and willingness to pay. The research methods were Contingent Valuation and an adaptation of The Van Westendorp Price Sensitivity Meter.

The sampling strategy involves specifying the population, sample size and sampling type. This step consisted of conducting two separate surveys. One of the surveys was carried out in Portuguese (PT), aiming at a target audience in Portugal, and the other was carried out in English, aiming at a cross-country population to get feedback from different parts of the world. As the market in Portugal is small, it was decided to cover the study in other countries.

One important aspect of the research methodology is the dissemination of the questionnaire. On the one hand, in the questionnaire conducted in Portuguese, the target audience was essentially the academic community, from students at the University of Porto, Alumni and faculty staff. Besides, the study was disseminated through groups on social networks, and through the student's personal and professional contact network, among which other groups of students were involved, mainly from Engineering, as well as other groups that comprised mainly contacts from the north of Portugal.

In relation to the questionnaire conducted in English, we disseminated it in two ways. First, to the attendees of the "*Inside the Circular Economy, Beyond the Basis"* workshop. The demographic results, as they will be developed below, reflect this very diversity of the study. In addition, it is also important to point out that this strategy was designed to represent dissemination in a market niche of scientists, entrepreneurs, engineers, among others, who, by getting involved in the training course, represent a target audience interested in sustainability, both from the point of view of eco-literacy, as well as purchasing attitudes. For this reason, the generalization of the results will be potentially limited, as the sample is biased.

Another consideration was the survey's spread on a group of a Training Event called CWMUN, Change the World Model United Nations, which gathered students from several countries. The project is related to United Nations Conferences, from which major issues of the international agenda are discussed, involving over 14 thousand students and 141 different countries of origin.

The study was in effect between April 30th and June 15th. More details about the study's demographics, which materialize the ideas already presented, will be given in the next chapter. The characteristics mentioned in determining the study's target audience validate the need to accurately choose respondents' profiles, justifying their suitability for the study. The intended sample size was 250 answers in the PT Survey and 50 in the EN Survey.

Regarding the type of questions used in the survey, the use of two types of questions throughout the questionnaire is highlighted, in addition to demographic questions to characterize the sample of respondents. On the one hand, open-ended questions were used, through which respondents answered numerical values, such as the case of WTP measurement, or other types of textual responses, like the nature of sustainable products or services they bought compared to general products without sustainable features, in the last three months. On the other hand, we also resorted to closed-ended questions, which are narrow in focus and usually answered with a single word or a pick from limited multiple-choice options. Likert scales and multiple-choice options were used for these questions.

The questions used in the survey were selected to shrink the target audience to a more representative panel, perceiving how demographic parameters, e-commerce habits, eco-literacy, and customer perception of the sustainable Marketplace are related to WTP, conditioning therefore how much the company can charge for a product or service with sustainable attributes. Therefore, some research groups were created, with different target audiences. It was important to use e-commerce habits to analyze the responses of those who really shop online, and eco-literacy, to understand the population that really cares about sustainable products and services, and that is minimally concerned about environmental issues.

3.3. Case Selection and Design

In terms of creating and designing a survey questionnaire, it is important to highlight some aspects related to data collection. In general, in addition to the aspects mentioned above, there is a need to assess Willingness to Pay through an objective question, which can be answered and easily transmitted by the survey questionnaire.

Regarding WTP, as the objective of the research was to understand how much the consumer would pay for the product or service, it was first asked about their e-commerce habits, about their eco-literacy, and then the respondents were asked what value they considered to be too expensive, too cheap or a bargain for the product and service.

As explained above, it was decided to carry out an online survey to answer the fundamental questions raised in this dissertation, both regarding consumers' willingness to pay for green products and services, and their opinion about the sustainable marketplace. The title and explanation at the beginning of the survey allowed the respondent to understand the reason for the survey, helping maintain participant engagement and interest.

To ensure the highest possible customer satisfaction, it is necessary to find out detailed information about the market for a product or service with the help of a target audience analysis. With this knowledge, the product or service can be tailored to the needs of the target group and addressed through marketing [122].

A target audience is a group of people who have the same or similar needs. It is usually described based on demographic and socio-economic characteristics, for example, "unmarried women aged 25 to 40 with a high income". The target audience definition enables a targeted consumer approach and thus more effective and more efficient marketing [122]. For MyGreenApp, and the purpose of this study**,** a clear focus on the target audience was essential.

Following the target audience comes the market segmentation. At its core, market segmentation is the practice of dividing the target market into approachable groups, with similar answers and product and service preferences [123]. Market segmentation creates subsets of a market based on demographics, needs, priorities, common interests, and other psychographic or behavioral criteria used to better understand the target audience. Thus, the creation of groups according to demographic, geographic, social, and economic criteria is strategic for a good data analysis. Thus, for analysis of this thesis, groups were created, developed in the data analysis chapter, according to different characteristics.

After finding and defining the right target group, it is important to explore the purchase behavior of the target group itself. CV and Price Sensitivity Meter represented direct questioning**.** In many cases, direct questioning is the simplest and most efficient method (so-called primary research).

The way we design a survey, or a form affects the answers we get. This includes the language used, the order of the questions, and the survey scale. There are three types of survey response scales. Dichotomous, rating scales, and semantic differential scales [124]. Some dichotomous scales were used, and mainly rating scales were applied. From the rating scales applied, the preferred was the Likert Scale, because of its increased range that allows nuances and insights over respondents' answers**.**

3.3.1. Demographics

Demographic survey questions are the backbone of much of today's survey research, as customer data has become increasingly important to businesses. These questions will provide the collection of data from customers that will be used to differentiate and segment groups based on demographic factors, such as a person's age, gender, location, occupation, educational background, and annual income. By dividing a market into smaller categories based on these factors, demographic segmentation can help to compare and evaluate how responses can vary according to a range of different demographic criteria and whether this could be influencing a respondent's answer [125]. Therefore, demographic segmentation is a crucial part of market research surveys.

Demographic data relies on simple facts about individuals, so it is generally easy to measure. Also, demographic data can be an ideal way to monitor shifts and societal trends over time. Identifying trends in this way can also help brands to track, monitor, and analyze the customer journey, so it's easier for them to make market predictions for the future, for the benefit of both the brand and the consumer [126]. As disadvantages of asking demographic questions, we can mention the risk of alienating some people, as

demographic data assumes that individuals in the same demographic categories also have the same needs, interests, and attributes, and this may not always be true. An important factor to take into consideration when conducting a survey experiment is that some people are sensitive about disclosing some data, such as their exact age or income. This way, using a range makes people feel more comfortable about sharing information [126].

To characterize the sample of respondents, in terms of their demographics, 8 questions were asked. The questions are considered below.

First, gender was evaluated. Gender refers to the social or identity distinction. Gender is a sensitive topic, and some people might not want to share their details on it with the researchers. The way we phrase this question can impact the participants in different ways. This way, we made sure to add the “Prefer not to answer” option. Three options were applied, as a multiple-choice format, being them the following:

- Male
- Female
- Prefer not to say

Second**,** age was asked about. A person’s knowledge and experience about a topic or subject will often be determined by his or her age. This parameter is often the defining factor in how people interact with products, make decisions, or view things. Age is normally used to segment different groups. But obtaining information about age also allows the researcher to see when age doesn’t have any impact at all, making discoveries about how similar different age groups can think about the same things [127]. Different age groups were evaluated to be compared to literature studies, regarding generational sustainability points of view.

As age is sensitive information, we used a multiple-choice format that uses age ranges for each answer. We used the following ranges:

- Under or 25
- 26-35
- 36-45
- 46-55
- 56-65
- Over or 65

Obtaining the economic profile of the target audience, characterized by income and employment, is also relevant to understand if the answers are affected by an income effect [128]. Income or employment information can be used to determine if rich and employed people are more willing to pay for sustainable products and services.

Profession or career questions are often asked in demographic surveys. A financial advisor will likely answer questions about money differently than someone from another profession. Profession questions allow survey researchers to factor in respondents' experiences or biases when analyzing survey results [127].

It's useful to know the participant's employment status as this contributes to their buying power [128]. About employment, i.e., the professional situation of the respondents, several options were used, according to examples reviewed in the literature. The options were the following:

- Student
- Student worker
- Self-employed
- Employee
- Unemployed
- Other

Education is a core demographic question because it provides insight into the type of work a participant may be doing. This way, asking a respondent what their highest level of education attained is often found on surveys. Respondents who completed a four-year degree at a college or university may answer questions differently than those whose education ended in high school [127]. Following the Employment situation, it was evaluated the highest education level attained by the respondents using the following options, based on the literature:

- Primary School
- Secondary
- Technical/community college
- High school diploma/A-levels
- Undergraduate
- Graduate
- Master
- Doctorate
- No formal Qualifications

In terms of geographical questions, it was asked from the respondents their current country of residence as well as the city where they now live. It was important to define geographical variables to understand, on the one hand, the variation in the country of origin and the variation in cities, which extends between the north, the center, and the south of Portugal.

And on the other hand, in the questionnaire in English, the geographic answers were diverse for both the countries of origin and the cities. Although a multiple-choice

question was considered, with different countries of origin, an open-ended question was used for the respondent to indicate both his country and his city of origin.

Still, in the characterization of the respondents' demographics, the family household was asked, with the following options:

- One
- Two
- Three
- Four or more

Presuming that a family equal to or greater than 2 can mean a marital status, it is considered not only that people who are married tend to have their purchasing decisions influenced by different factors compared to someone who is not, and that children, because of a marriage, play an important role in purchasing decisions and influence the customer's personal preferences. This means that customers with children will have different needs than those who don't [128]. In line with what was done for age, when it comes to income, several income ranges were used, as this is also considered sensitive information, and respondents felt more comfortable with this type of response.

Household income was evaluated, referring to the total amount of money made by people living in the same home. This sum includes the participant's income, their spouse's, and any other people living in their house. Collecting this information helps to understand the amount of buying power customer’s control. The following multiple-choice options were used as follows:

- 0 to 15 000€ per year
- 15 000€ to 30 000€ per year
- 30 000€ to 45 000€ per year
- 45 000€ to 60 000€ per year
- Over 60 000€ per year

Following the OECD, *the Organization for Economic Cooperation and Development*, the average adjusted net income available per household per capita is US$ 33,604.00 per year. Furthermore, on average across OECD countries, the adjusted net disposable income of the top 20% of the population pyramid is estimated at US$69,477.00 per year, while the bottom 20% live on an estimated income of US$11,026 .00 per year. Over the past few years, households have enjoyed higher incomes on average and financial wealth has increased in many OECD countries [129].

In this sense, evaluating how household income interferes with the willingness to pay more for products and services is essential, considering the options available for presenting income questions and how they will best resonate with the audience.

That said, the scale presented above, as multiple-choice answers, was selected, with minimum values of average annual household income from 0€ to 15,000€ and maximum incomes over 60,000€.

This type of background information allows researchers to categorize the answers of different individuals, see which groups they fit into and examine whether any of these factors may be influencing a respondent's answer on willingness to pay.

3.3.2. E-commerce habits

In general, single-answer questions were used in this questionnaire. As shown in the literature, e-commerce habits have skyrocketed in recent years. From large retail companies to small businesses, driven by their presence in online marketplaces, the frequency with which the common consumer uses the internet to shop has been growing. From the perspective of ethical and sustainable e-commerce and marketplaces, there has also been growth [15].

E-commerce evaluation gains its importance because of avoiding sampling bias. Sampling bias is a systematic error that can condemn the results of a survey questionnaire. Regarding the population, the sampling technique, if it is non-random, and if some data are not fixed, can favor, or disfavor, the selection of some elements of the population over others [130]. So, in order not to bias the results, questions such as: "what purchases did you make?" and "how much more did you pay?", for example, are important.

Thus, to also avoid data bias, it was considered necessary to assess the respondents' e-commerce habits. First, objectively, a numerical question was asked, regarding the number of online purchases made by the respondent in the last three months.

Second, in a different way, but with a similar purpose, a multiple-choice question was used, asking the frequency of purchase of products online. The response options considered were as follows:

- Every week
- Two or three times a month
- Once a month
- Once every three months
- Once every six months
- Never

Then, respondents were asked whether they think about sustainability during the product or service purchase process. A multiple response format was used, with the following response categories:

- All the time
- Usually
- Sometimes
- Not very often
- I don’t know

Finally, to better understand consumer behavior and associate it with environmental parameters, the respondents were asked if they had purchased any sustainable product or service, compared to its usual form, in the last six months. As the last question is a dichotomous question, in addition to the answers "yes" and "no", the option "I don't know" was also offered, considering that the respondent may not be aware of the comparison. To end the section on e-commerce habits, and to validate the previous question, respondents were asked to give an example, in an open response, of a sustainable product or service they had recently obtained.

With the purpose of the data sample being representative of a target audience that already makes online purchases, in the dissemination of the questionnaire, the target audience was mentioned.

3.3.3. Eco-literacy

Gauging the level of eco-literacy arose from the need to associate know-how in terms of sustainable information to the way it influences willingness to pay for sustainable products and services, sold on a marketplace.

If its influence is verified, the need to invest more in consumer knowledge regarding the products and services sold is reinforced. By defining a target group for this aspect, we will be making sure that the audience is sustainability-focused.

“Ecological literacy” refers to the knowledge and understanding about ecology - environment and sustainability - and the ability to use ecology-related information to make informed decisions. Ecological literacy is the ability to understand the natural systems that make life on earth possible [131].

This parameter combines the sciences of systems and ecology in drawing together elements required to foster learning processes toward a deep appreciation of nature and our role in it. According to *Fritjof Capra*, "In the coming decades, the survival of humanity will depend on our ecological literacy – our ability to understand the basic principles of ecology and to live accordingly. This means that Eco literacy must become a critical skill for politicians, business leaders, and professionals in all spheres, and should be the most important part of education at all levels” [132].

In the face of the increasing capacity of industrial systems to destroy habitats and the climate system, the explicit declaration of the principles of ecological literacy – and

the resulting awareness of the importance of living within the ecological carrying capacity of the earth, open ways to working towards a more sustainable human society, understanding the principles of organization of ecosystems and their potential application. The survival of humanity depends upon our ecological literacy, and the need to protect the ecosystems is a biological imperative for survival over time, which means that ecological literacy must become a critical skill for all humans to embrace, prioritizing thought and action into a sustainable society [133].

Eco-literacy was measured through four different questions. The first two had a dichotomous answer (yes or no), and respondents were asked if they have any training in the environmental area such as sustainability or circular economy. Additionally, whether the respondent follows any environmental forums, websites, or pages on social media.

The next two questions were made using the Likert scale. A scale from 1 to 7 was used, and when responding to a questionnaire based on this scale, respondents specified their level of agreement with a statement. This way, for the first question, respondents were asked about how familiar they were with environmental issues, such as global warming, scarcity of natural resources, or habitat destruction, within a scale of 1 meaning poorly familiarized, and 7 strongly familiarized.

For the second question, the respondents were asked about how familiar they were with environmentally friendly products sold in online marketplaces, within a scale of 1 meaning not informed and 7 strongly informed.

3.3.4. Willingness to Pay

Case studies are often used when the problem is considered complex. Regarding the measurement of willingness to pay more for sustainable products and services sold on a marketplace, it was necessary to choose case studies that are considered representative both in terms of market trends and environmental impact.

After the study and analysis carried out in the literature review, as well as the market study carried out, it was decided to choose the sectors of the fashion industry, represented by an example of a sweater product, and the transport and food packaging sector, represented by an example of a food home delivery service.

In choosing the products and services to use, it was necessary to choose something that represents environmental degradation as well as social challenges. It ended up taking more into account the environmental factor, through the labels used, with any ethical labels being set aside.

The choice of the example product and service was judicious. The chosen product sought to represent a product whose life cycle involves several resources, of high environmental importance, such as raw materials (fabrics), energy (for clothes making machines and for dry cleaners), and water. Likewise, the service chosen involves not only the packaging of the food that is being delivered to the person's home but also any greenhouse gases emissions caused by shipping.

When it comes to measuring the assessment of willingness to pay, it was important to have encouraging elements, such as pollution indicators, resource expenditure, and environmental labels, to evaluate its influence on willingness to pay.

3.3.4.1. Sweater

As previously mentioned, for the product example study, a sweater was chosen. A baseline reference price was used, that is, a price considered as a base for the shirt in question, with its normal characteristics. After some research carried out online, regarding the average prices of a sweater sold on a marketplace, a base value of 20€ was assigned to the shirt. Thus, the respondent was exposed to the context of considering he or she wants to purchase a normal sweater online that costs 20€.

The respondent was later asked to consider a new model of the sweater, that has the same size, looks, and functionality. However, this new eco-version has an environmental certification check using recycled fibers, organic cotton, natural dyes, less production water, and a smaller carbon footprint.

These last features were displayed in an image, for a better understanding of the respondent, having presented two shirts of different brands, brand A and brand B, as seen in Figure 16, from which one had its characteristics, ecological or not, exposed.

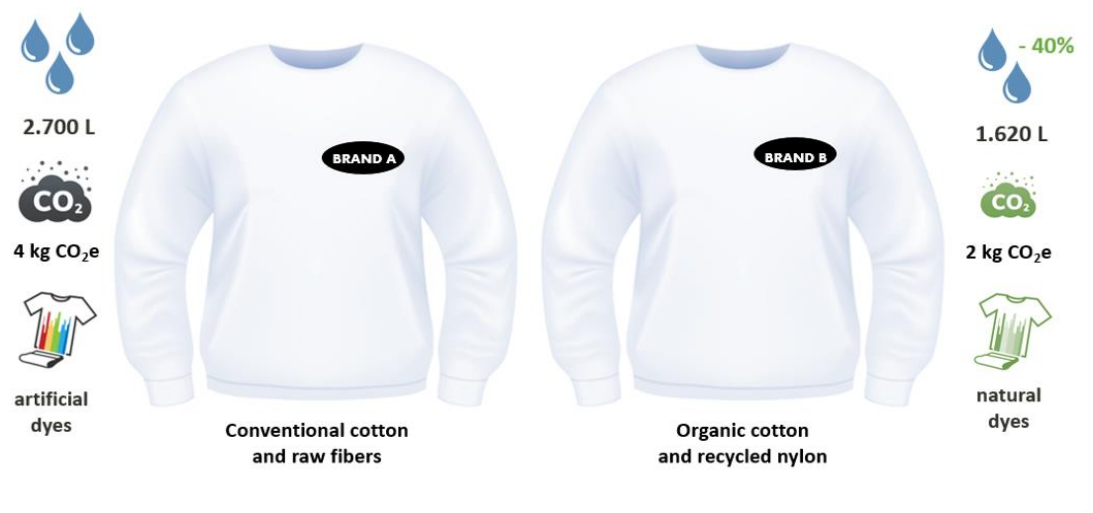


Figure 16 - Survey sustainable attributes regarding WTP for the product example.

Clothing in general has complex supply chains that make it difficult to account for all the emissions that come from producing a new sweater. Besides, there is how the clothing is transported and disposed of, when the consumer no longer wants it anymore [134]. Through a study carried out to understand the main parameters that are considered in the sale of sustainable fashion products on some of the sustainable marketplaces previously noted, it was decided to associate four factors.

The first factor considered was water. 70% of all the water people use globally is used in agriculture. That water is essential for the food we eat, as well as crops like cotton. The growth, manufacturing, transporting, and washing of cotton uses huge amounts of water, so this parameter was vital as an environmental indicator. As for water consumption, it was considered that a normal cotton t-shirt can take 2,700 liters of water to be produced, which is enough water for one person to drink for 900 days [135].

Regarding the experiment carried out, concerning the shirt of brand A, it was considered a water consumption of 2.700 liters, and when it comes to the shirt of brand B, it was considered a water consumption of about 40% less, that is, 1.620 liters. The last factor was based on a study regarding reduced water usage (39%), in the production of organic cotton through a sustainable farming method [136].

The second factor considered was the carbon footprint, that is, the total greenhouse gas emissions caused by the product life cycle expressed as carbon dioxide equivalent (CO_2eq). Studies show that the entire production process of a sweater generates almost 4 kg of carbon dioxide emissions [137]. In association with fewer emissions from using organic cotton, other sources state that switching to recycled polyester fabric can help to reduce the carbon emissions, once recycled polyester (i.e. nylon) releases half to a quarter of the emissions of virgin polyester [138]. This way, as for greenhouse gas emissions regarding the experience, about the shirt of brand A, it was considered a carbon footprint of 4 kg of CO_2 e.q., and for the brand B sweater, it was considered half of it, that is, 2 kg of CO_2 e.q.

The third factor considered was the use of dyes. Fabric dyes pollute water bodies, with devastating effects on aquatic life and drinking water. In the case of a colored shirt, it goes through a dyeing process. Textile dyeing accounts for about 20% of the world's drinking water pollution [137]. Color dyes are typically fixed to fabric using compounds that include heavy metals such as mercury, lead, cadmium. These pollutants are easily found in wastewater from textile factories which, in some parts of the world, can be discharged directly into rivers and lakes without prior treatment – and even when treatment systems are used these compounds are difficult to remove, sometimes remaining in small amounts in the water, which poses a strong threat to biodiversity and water potability [139].

As for dyeing, it was considered in the case of brand A that the shirt used artificial paints, and therefore polluting, and in the case of brand B, natural paints, less or not polluting, were used. Finally, as for the composition of the sweater, the difference between brand A and brand B was mentioned, while one was composed of conventional cotton and raw fibers, the other was made using organic cotton and recycled nylon.

After taking these considerations, it was sought to understand the impact of this environmental information, which translates into greater sustainability of the example product of the B brand, in the willingness of people to pay for it. This way, in the survey, respondents were asked to answer with a whole number (€), about the sweater's brand B. First, a Contingent Valuation approach was used, asking consumers directly about their WTP. Therefore, the participants were asked about how much they would be willing to pay for this new eco-friendly version of the sweater.

After that, they were noted to recall the item they were considering purchasing and the price they said they would be willing to pay. Then, three questions from the Van Westendorp Sensitivity Meter were asked. The questions were the following:

- At what price would you consider this product to be priced so low that you would doubt its quality?
- At what price would you consider this product to be so expensive that you would not consider buying it?
- At what price would you consider this product to be a bargain—a great buy for the money, and the environmental impact avoided?

3.3.4.2. Home Delivery Service

For the service example study, a home delivery service was chosen. The respondent was asked to consider that he or she wanted to place an order online for a food service home delivery. The service example would enroll a company that would be responsible for the packaging and transport methods. As a baseline reference price, it was considered that a motorbike transport, with safe, secure, and sterilized packaging, would cost a basic fee of 5€.

This value was assumed to be representative of the base service, without the sustainable characteristics. As a rule, regarding companies that carry out home deliveries, in particular food deliveries, the fee applied depends on the peak hours, either in the orders or in the restaurant of origin in question. Thus, this value was used to expose a baseline.

The respondent was later asked to consider a new model of the service, however, the new company would assure not only recycled and organic packaging but also carbon-neutral transport, by bike. To avoid confusion, the respondent was informed to assume that the changeover to the bicycle did not cause any delays in the delivery. In

comparison with the average service, the new packaging would weigh less than half of the carbon emissions. These last features were displayed in an image, for a better understanding of the respondent, having presented the two different services, as seen in Figure 17, each with its characteristics.

Figure 17 - Survey sustainable attributes regarding WTP for the service example

Focusing on the greenhouse gas emissions from transport and the type of food packaging, these factors were selected to expose the respondent to the distinctions in environmental characteristics. It was believed that carbon footprint and packaging would be two distinguished parameters, because of their importance in terms of environmental impact.

Standing out some important concepts, a carbon footprint, like other GHG assessments is expressed in terms of its global warming potential (GWP). GWP embraces the impact of different GHGs (CO_2, N_2O, CH_4, O_3, etc.) on global warming and the GWP of all GHGs are expressed in terms of the impact on global warming of the equivalent weight (usually in grams or kilograms) of CO_2 equivalent (CO_2eq) [140]. Depending on the databases and calculation methods used, the carbon footprint varies for the same product or service, depending on the country of origin.

Since there are several databases to calculate the carbon footprint, a survey was carried out about records of conversion factors for carbon emissions. As no concrete data was found, concerning Portugal, regarding the object of study being motorcycle trips, another database was considered. Therefore, regarding the experiment carried out, it was used as a reference to the data set of the UK Government to GHG Conversion Factors for Company Reporting [141]. This choice was considered viable since the United Kingdom, despite not being part of the European Union, has free access and a complete database of carbon emissions accounting. The data provided by this reference presents itself as suitable for use by UK-based organizations of all sizes and international organizations reporting on UK operations.

In this sense, it was searched in the database for Passenger vehicles conversion factors, used to report travel in cars and on motorcycles. This way, it was used the value referent to an average motorbike, which emits 0.11337 kg CO2 eq per kilometer (km). Approximating this value to a more general one, an issue value corresponding to 100 g CO2eq per km was used to the standard home delivery service.

About the packaging, there are some notes to highlight. Plastics that are not recycled, and reach the landfill, take a long time to decompose and are highly harmful to the planet. One way to reduce the volume of plastic waste generated is to have a conscious consumption of these materials, to reduce its waste [142]. In the survey, in the exhibition of environmental information regarding food packaging, about the standard service, was expressed the use of non-recyclable packaging. This type of packaging is still very used today.

As a reference to plastic non-recyclable packaging, we can highlight polyurethane, ethylene vinyl acetate, and PET (polyethylene terephthalate) packaging [143]. Exposing the information that the food packaging is not recyclable should interfere with the consumer's purchasing behavior, affecting their WTP. Although today many packages are already partially recyclable or made with sustainable materials, it was decided to categorize the base service as having non-recyclable and non-sustainable packaging, to obtain a clear point of comparison regarding the interference with the consumer's willingness to pay more for the new “eco-service”.

About the packaging of the new type of sustainable service, two labels were used to characterize recyclable and biodegradable packaging. To measure the willingness to pay for the sustainable service, it was decided not to use quantifiable impact values, as it was done in the case of the product, and to use only environmental labels, to understand their interference in the consumer's purchasing behavior, through their knowledge and perception of them. It is thus intended to portray in this eco-service the use of sustainable packaging, which are made of organic, recyclable, and/or biodegradable materials, produced with a reduced amount of energy and natural resources, and cause a minimum environmental impact after the discard [144].

Following the same reasoning used in measuring the willingness to pay for the product, in the service case we also attempted to capture the impact of this environmental information in the willingness to pay for the home food delivery service.

Therefore, respondents were asked to answer with a whole number (€) about the eco-service, translated by the transport method being by bike and sustainable packaging. First, a Contingent Valuation approach was used, asking consumers directly about their WTP. Afterward, the participants were asked about how much they would be willing to pay for this new version of the service.

After that, they were asked to recall the item they were considering purchasing and the price they said they would be willing to pay. Then, three questions from the Van Westendorp Sensitivity Meter were asked. The questions were the following:

- At what price would you consider this service to be priced so low that you would feel its safety/quality wouldn't be assured?
- At what price would you consider this service to be so expensive that you would not consider buying it?
- At what price would you consider this service to be a bargain—a great buy for the money, and the environmental impact avoided?

3.3.5. Sustainable Marketplace

Considering that most of the research developed was done in the context of the app MyGreenApp, we used to opportunity to survey potential customers on the perceived benefits of the platform. MyGreenApp aims to combine a sustainable marketplace, a social network, and a tool to measure the carbon footprint of products and services, called CO2 trackers. The vision is to help people and organizations reduce their impact on nature, aiming at a zero-carbon footprint. Considering this setting, four questions were made.

First, the respondents were asked to rate using a Likert scale how much would they be willing to pay more for sustainable products and services, sold on a sustainable Marketplace, being 1 wouldn't give more money and 7 would accept a reasonable price for the marketplace service.

Following this question, respondents were asked what price range they would consider reasonable for the green premium of a sustainable product or service to be sold on a sustainable marketplace. This question was made using multiple-choice options, being them the following:

- I would not consider paying more for a green premium
- 0 to 15%
- 15% to 35%
- More than 35%

The last questions covered the CO_2 tracker and the social network. Using a Likert scale, the third question asked the respondents whether they would find helpful a carbon footprint tool for the products and services sold in a marketplace, at the time of purchase. The fourth question asked the respondents if they would find social media that would allow them to get people's feedback on products and services sold in a sustainable marketplace.

3.4. Data Analysis

Traditional methods of statistical analysis were used. First, a descriptive statistic of all data was made, in which the absolute and relative frequency of all answers for the different questions were collected and are presented. It was necessary to find outliers, discrepant data, and remove this data from our sample so that they do not skew the sample.

First, regarding the Likert Scale, through which survey participants specify their level of agreement or disagreement with a given statement, different scale responses were used. In e-commerce habits, frequency responses were used to understand the frequency with which the respondent made purchases online, and probability responses to understand the veracity with which the respondent thought about sustainability during the process of purchasing a product or service. In eco-literacy, agreement Likert scales were used to understand respondents' familiarization with environmental impacts and eco-friendly products sold in marketplaces. Finally, in the Sustainable Marketplace, a question with a Likert scale of the agreement was used to assess how much consumers would be willing to pay more for products and services, gathered in a Marketplace; and two questions with Likert scales of importance to assess the appreciation of the importance of the carbon footprint measurement tool when purchasing a product and service, and the importance of the social network, when gathering feedback on products and services, within the MyGreenApp Marketplace.

As a rule, Likert and others recommend that it's best to use a wide scale. In all scales used, 7 values were defined, to have three negative values, one neutral, and three positive values. One of the advantages of scale is that it captures nuances in stimulus perception that are not glimpsed in a binary judgment [145].

To correctly assess WTP, we searched how to formulate the question in the context of a consumer survey. A common and simple way to ask about WTP in a survey is by using an open-ended question. After presenting the product/service concept, respondents are asked about how much they'd be willing to pay.

Through Contingent Valuation, the respondents were asked directly how much they would be willing to pay for the new version of the product or service, which includes sustainable characteristics. As a direct approach, the data were analyzed on a scale from 1 to 50€, identifying the frequency of responses from different ranges of values, thus representing the general result of the willingness to pay for the product or sustainable service. As it represents a straightforward approach, these questions were used to classify other target groups related to demographic parameters, e-commerce habits, and eco-literacy.

As far as the Van Westendorp Price Sensitivity Meter, it is a set of four open-ended questions that should be asked immediately after presenting the product or service concept. Using respondents' answers to these four questions allows us to draw four price curves, ultimately revealing the optimal price range for the product or service, that is, the range of prices that are likely to maximize the company's revenues. A price sensitivity meter (PSM) is used for new products where no obvious benchmarks or competitor equivalents exist. Though it is not based on any theoretical foundation, the PSM provides a useful framework for assessing the price range for unique new products.

After respondents are shown the test item (the new product or service), they are presented with contextual information and a baseline price. After that, four questions are asked to the respondents – at what price would you consider this product or service to be:

- A bargain? (inexpensive/cheap)
- Priced so cheaply that you would question its quality? (Too cheap)
- Priced expensively? (expensive)
- Priced so expensively that you would not buy it? (Too expensive)

Intersection points in the graph, as seen in chapter 2.8.4, constitute price thresholds – optimum price, indifference price, and upper and lower limits of acceptable prices. The "Optimum" Price Point is the price at which the number of respondents who consider the product too cheap is equal to the number who consider it too expensive. The Indifference Price Point is the price where the number of respondents who regard the price as a bargain is equal to the respondents who regard the price as expensive. According to Van Westendorp, the range of acceptable prices lies between the Point of Marginal Cheapness and the Point of Marginal Expensiveness.

The Van Westendorp Price Sensitivity Meter has two goals. On the one hand, it allows the researcher to identify price thresholds. On the other hand, it allows the researcher to identify the price range of acceptable prices for a product or a service. To determine the limits of a price range, the target audience should answer four questions that can be included in a market research questionnaire.

Despite these considerations, for this thesis not all questions were applied, having excluded the question regarding at what price would the customer consider the product starting to get expensive, so that it is not out of the question, but would have to give some thought into buying it, representing the expensive/high side.

This has been done once the goal was to directly measure willingness to pay by the Contingent Valuation Method. As for PSM, the main defined goals were to determine the optimal price point (OPP), to compare with the CV results, and the Point of Marginal

Expensiveness (PME), to sustain an upper boundary point, where cost becomes a concern, and customers feel the price of the product/service to outweigh the benefit.

This way, needing to obtain these intersection points, the other three questions were asked: Priced so cheaply that you would question its quality? (Too cheap); Priced so expensively that you would not buy it? (Too expensive); A bargain? (inexpensive/cheap).

3.5. Key Research Considerations

As explained in the literature review of existing methods to assess people's willingness to pay, it is important to highlight the limitation of this study about the fact that it deals with stated preferences, rather than revealed preferences. Revealed preferences would be related to effective market studies, or to WTP methodologies that involve the consumer in the process of purchasing a product or service. As there is a difference between what people say they would pay and what they pay, further studies should be done to get a clearer picture of the situation. To this purpose, the research approach of experimental economics could be helpful, as WTP is framed as a real-life problem where participants are endowed with a real sum of money.

The elaboration of this survey did not involve any a priori structure based on an existing survey of any scientific article. Through the study of articles and thesis related to the theme of sustainable marketplaces and the willingness to pay, several aspects and features to be applied in the experiment were considered, which resulted in the structure used.

Avoiding bias was essential. The sampling bias may have a cause in the sampling technique - especially if it is non-random, where it happens more often to favor or disfavor the selection of some elements of the population over others. In this regard, it is important to note that the questionnaires were essentially promoted between an audience of an academic community and an audience of a community of training on the circular economy, with responses from all over the world, from people trained or looking for training in the field of sustainability.

As already mentioned, data was initially cut in the characterization of the sample, removing outliers. It was intended to have a diversified sample initially, among the target groups surveyed, however, later in its analysis, it was necessary to be careful not to have a conditioned sample, and to select only the data of interest.

Although several analyzes could be carried out, preference was given to the demographic profile, associated with gender, age, and income, as well as e-commerce and eco-literacy habits, concerning Willingness to Pay.

4. Results and Analysis

We obtained 352 responses to the questionnaires. Of these, 288 responses were for the questionnaire made in Portuguese, while the remaining 64 responses were for the English version of the questionnaire.

As explained in the data analysis, initially it was necessary to exclude certain answers, as there were invalid responses for analysis. The answers excluded were those from which the respondent did not reply to what was asked from the survey, from textual or numerical responses. Several scales were used in the responses. For the PT and EN questionnaires, the following scales were considered.

Table 9 - Scales considered in the survey experiments.

PT Survey					
				Lower limit	Higher Limit
E-commerce Habits			Number of online purchases	0	50
WTP Measurement	Product	CV	Direct Measurement	10 €	60 €
		PSM	Low Price	1 €	30 €
			High Price	1 €	100 €
			Optimal Price	10 €	45 €
	Service	CV	Direct Measurement	1 €	25 €
		PSM	Low Price	1 €	15 €
			High Price	1 €	50 €
			Optimal Price	1 €	30 €
EN Survey					
				Lower limit	Higher Limit
E-commerce Habits			Number of online purchases	0	150
WTP Measurement	Product	CV	Direct Measurement	1 €	50 €
		PSM	Low Price	1 €	40 €
			High Price	25 €	100 €
			Optimal Price	1 €	55 €
	Service	CV	Direct Measurement	1 €	15 €
		PSM	Low Price	1 €	6 €
			High Price	1 €	30 €
			Optimal Price	1 €	10 €

To avoid sampling bias, it was necessary to understand how the demographic data collected could interfere with the analysis. Thus, several study groups were defined to understand if they were biasing the sample. Through the demographic analysis performed we observed which categories of sex, age, and income were most prominent among the respondents, to define reference points, to carry out tests to determine whether these factors exert influence on Willingness to Pay.

4.1. Demographics

To characterize the sample of respondents, in terms of their demographics, 8 questions were asked. First, we look at the gender of the respondents. Both in the survey carried out in Portuguese as in the survey carried out in English, we can conclude that it was possible to obtain a consistent mix for both males and females, as it is seen from Figure 18, which is representative of the general population.

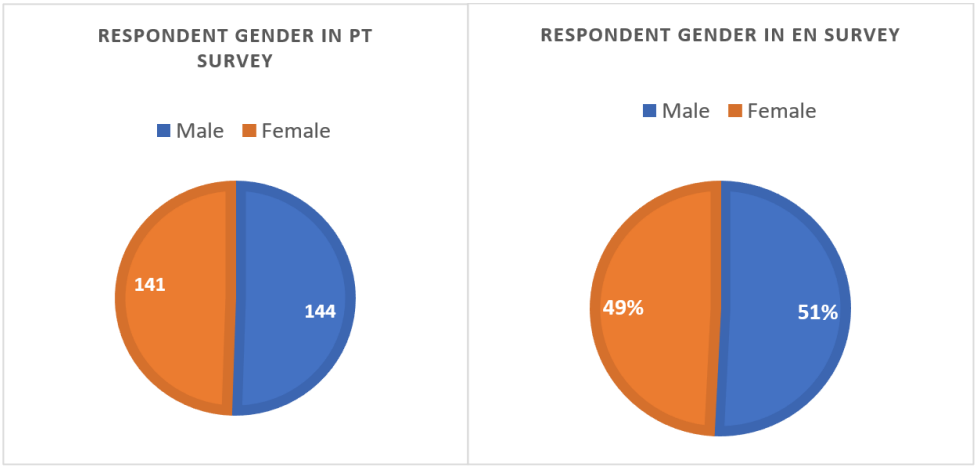


Figure 18 - Circular diagrams of gender characterization of respondents for both surveys

The next parameter considered for evaluation was the age of the respondents. It is possible to see that in the questionnaire conducted in Portuguese, there is mostly a young population, with about 45% of the sample comprising respondents aged up to 25 years, 23% of the sample aged between 26 and 35 years, and the remaining ages, little representation was obtained. Regarding the questionnaire in English, there is a higher percentage of respondents between 26 and 35 years old (39%), with a uniformity between the other age ranges (from 14% to 17%), apart from the age above 65, for which it was not obtained answers.

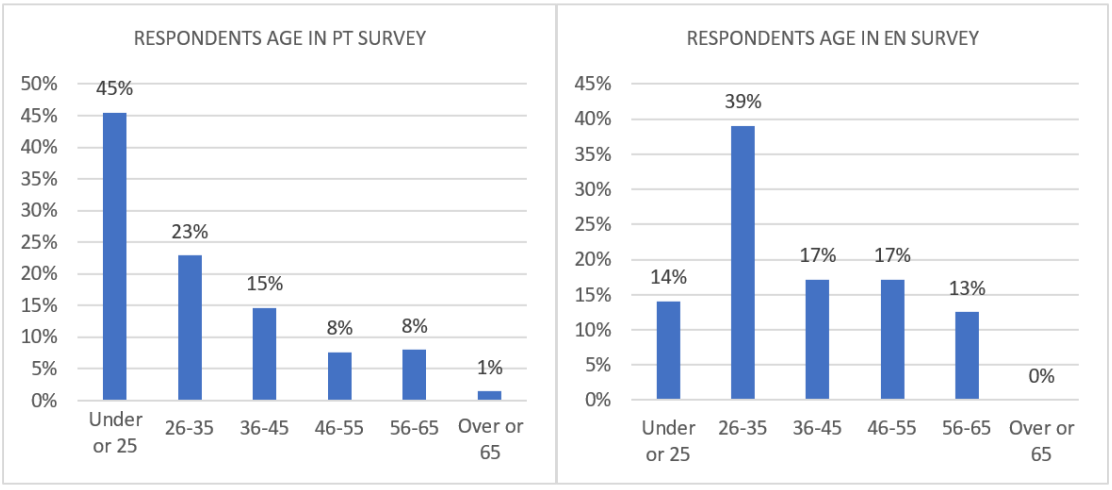


Figure 19 - Age characterization of respondents for both surveys

Next, the analysis of the respondents' professional situation is highlighted. In the questionnaire conducted in Portuguese, there is a predominance of employees (47%) and students (36%). In the questionnaire carried out in English, however, there is a predominance of the professional status of the respondents corresponding to employees, with more than half of the total responses (55%), followed by the number of students and workers own accounts, with 20% and 13% respectively.

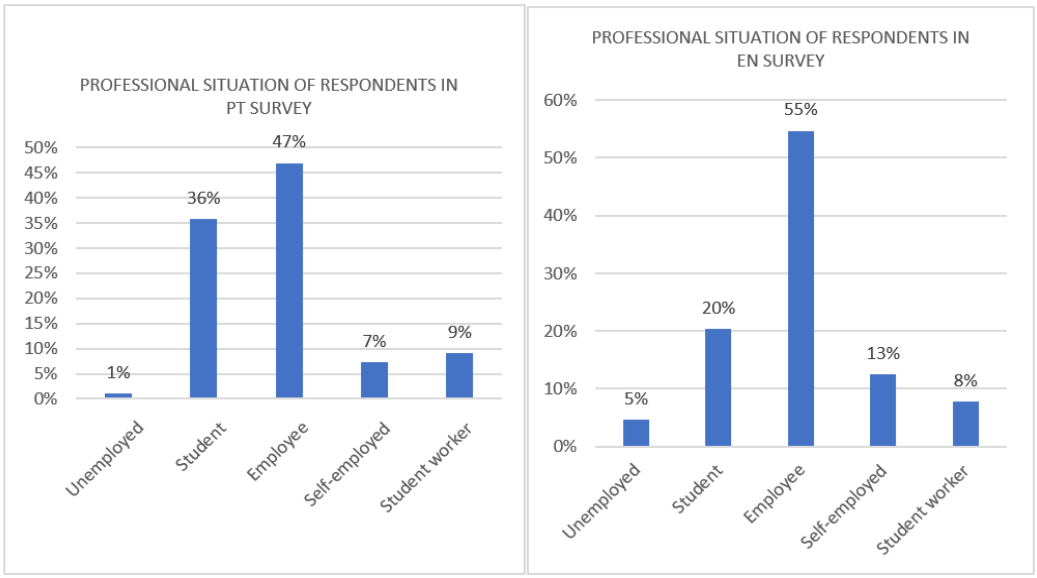


Figure 20 - Professional situation of the respondents for both surveys

With regards to the educational level, there is a slight difference in the categories used, which is justified by the fact that in the questionnaire in English, more diversified teaching scales adapted to multinational responses were selected.

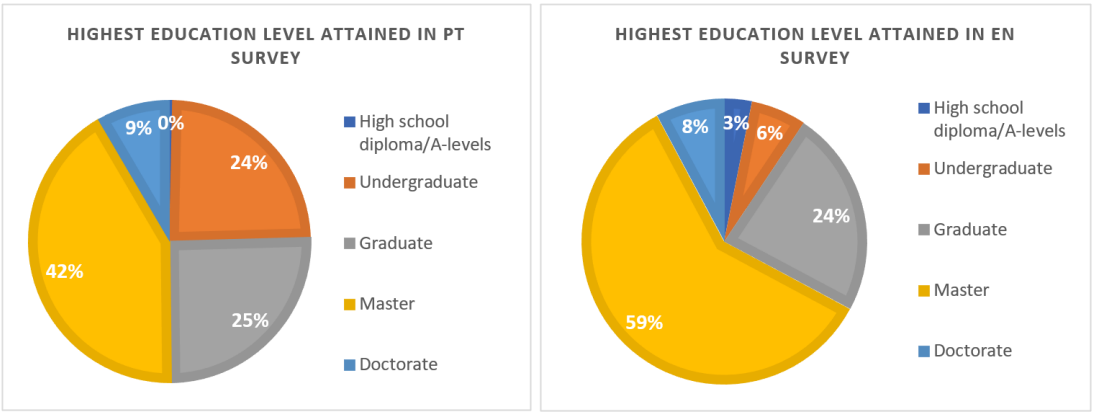


Figure 21 - Education level of the respondents for both surveys.

It was found that, in the Portuguese questionnaire, the level of respondents with a master's degree was predominant (42%), followed by a comparable level of graduates and respondents with secondary education, as well as a somewhat significant fraction of doctorates, and no respondents with basic education.

As for the questionnaire in English, there is a greater predominance of respondents with a master's degree (59%), as well as a substantial fraction of graduates, followed by some doctorates, undergraduate, and high school diplomas.

The questionnaire carried out in Portuguese had a predominance of respondents from Portugal, with around 96% of the responses from the target audience. In addition, some responses from Brazil, Germany, Finland, France, Norway, Thailand, and the United Kingdom were also considered. These answers can indicate Portuguese people who are living or working abroad. Regarding the answers from Portugal, the origin is predominant in the north of the country, which is consistent with the fact that the questionnaire was essentially disseminated in the academic community of the University of Porto. Notwithstanding, there are also results from other parts of the country.

As for the English questionnaire, there is a wide variety of geographical locations. The survey was sent to people who carried out a training on Circular Economy promoted by the Ellen MacArthur Foundation, which is attended by a diverse audience. This could cause a sampling bias, limiting the generalization of the results. However, this survey was devised for a conscious target audience.

Mainly, results were obtained from respondents from the European Union. In Europe, responses were obtained from the United Kingdom, Portugal, Spain, Germany, France, Finland, Sweden, Austria, Italy, Belgium, Poland, Switzerland, Ukraine, The Netherlands, and Norway. Additionally, responses were obtained from North and South America, from the United States of America, and Colombia. In Africa, responses were obtained from Egypt. On the Asian continent, responses were obtained from Russia, the United Arab Emirates, Malaysia, Vietnam, and Palestine.

Annex 3 presents a table with the number of responses for each country assessed, as well as the average WTP values for the product and service cases measured through the direct question of the contingent assessment method.

In terms of characteristics of the household, there is a predominance in the Portuguese questionnaire of a household of 4 or more people (37%), followed by a household of 3 people (26%). Regarding the English questionnaire, there is a difference in the predominance of a household of two people, followed by four or more, with 37% and 31%, respectively.

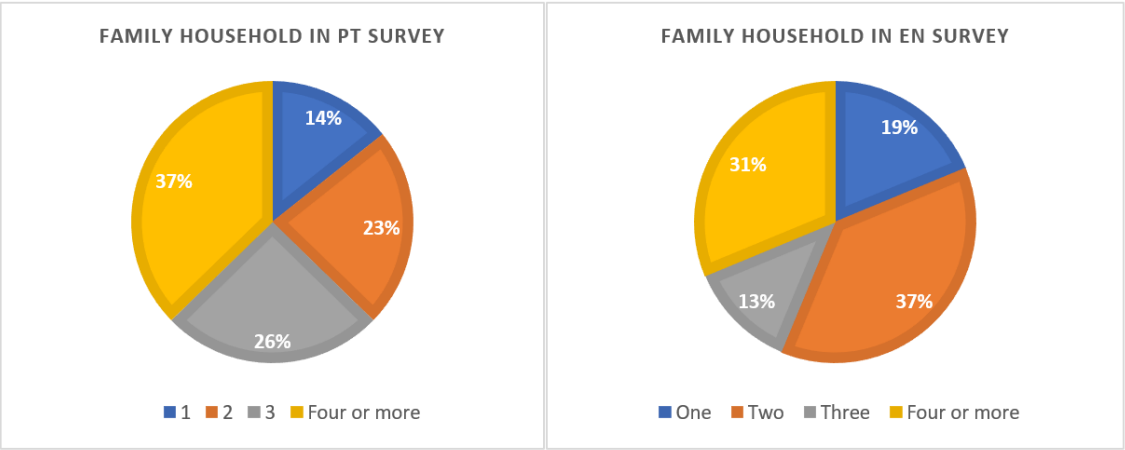


Figure 22 – Family household of the respondents for both surveys.

Finally, to finish the demographic characterization of the target audience, the household average income was evaluated. Thus, regarding the questionnaire carried out in Portuguese, there was a predominance of an annual family income of 15 to 30 thousand euros per year, followed by a similar distribution for both 0 to 15 thousand euros per year and 30 to 45 thousand euros per year.

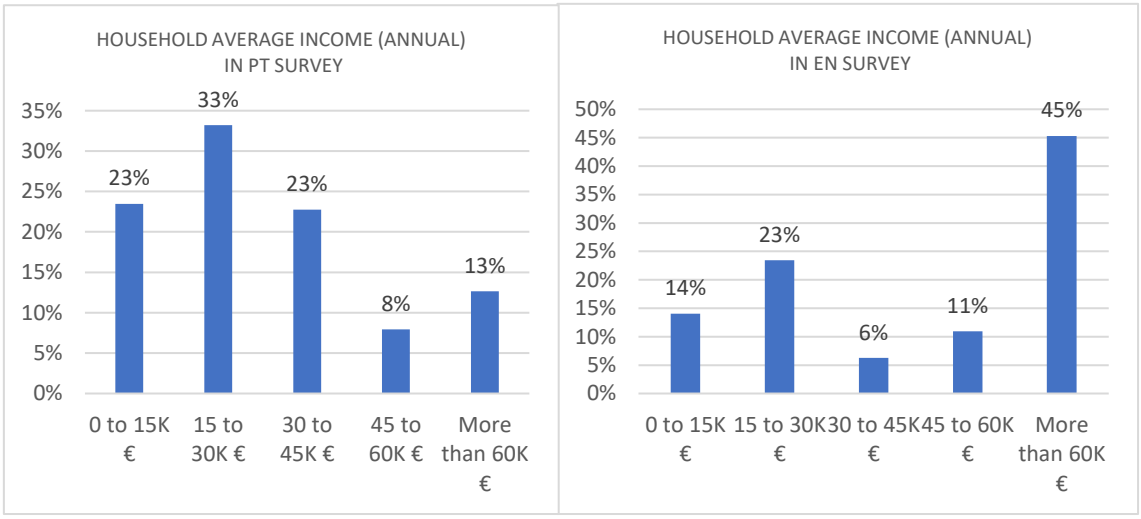


Figure 23 – Household average income (annual) of the respondents for both surveys.

These values are in line with the OECD average estimates. About the questionnaire carried out in English, almost half of the responses (45%) claim an annual family income of more than 60 thousand euros per year, followed by the range of income between 15 thousand euros and 30 thousand euros per year. This may be explained by the fact that a significant number of the respondents were international, and the income brackets were not PPP-adjusted.

4.2. E-commerce habits

Regarding the respondents' online shopping behavior, it was important to use e-commerce habits to analyze the responses of those who really shop online.

Initially, a question was asked regarding the number of online purchases made by the respondent in the last three months. The answers were quite diverse, as the respondent had the opportunity to answer a whole number as an average estimate of the purchases made during the three months. An extensive analysis of this question is not carried out, as it only served as a foundation for the following questions, to encourage the respondent to be more honest in their answer regarding the frequency of online products and the thinking of sustainable purchase.

With regards to the Portuguese version, we found that 67% of respondents made up to 5 purchases in the last 3 months, 25% made up to 10 purchases in the same period, and only 7% said they had made more than 10 purchases in the last three months. Regarding the English questionnaire, results were similar, with 47% of international respondents making up to 5 purchases in the last 3 months, 33% making up to 10 purchases in the same period, and 22% said they had made more than 10 purchases in recent months.

In addition, respondents were asked how often they purchased products online. Regarding the questionnaire in Portuguese, it was found that 30% of respondents said they shop online at least once a month, followed by 26% of respondents who shopped two to three times a month and 19% once every three months. Only 7% said they shop online every week.

Regarding the questionnaire in English, respondents exhibited more frequent shopping habits. 36% say they buy products online two to three times a month, and 19% say they shop online every week. In addition, in the remaining response categories, the values were all higher, and while in the PT survey 5% of respondents said they did not buy online, in the questionnaire in English there was no such response.

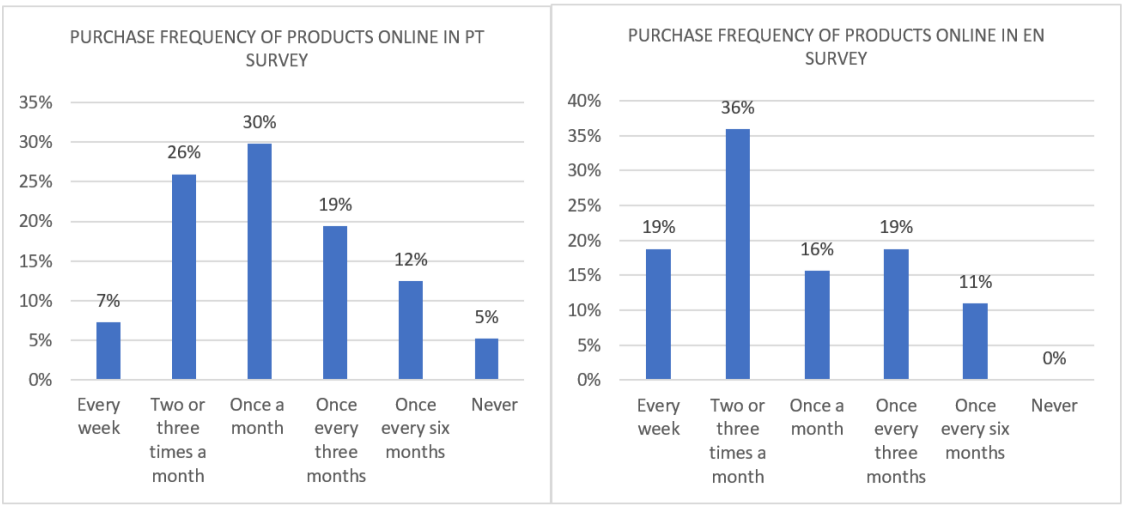


Figure 24 – Purchase frequency of online products of respondents from the survey.

The respondents were also asked if they consider sustainability aspects when they are purchasing a product or a service. This question was used to create the main target group that concerns respondents with frequent e-commerce habits and high eco-literacy.

Regarding the results of this question, it was found for the survey in Portuguese that only 7% of respondents consider sustainability when purchasing a product or service. 33% say they think about environmental sustainability normally, 35% only sometimes, and 23% say they don't do it very often.

In opposition to these results, in the English questionnaire, there is a higher percentage of respondents who consider sustainability in the purchasing process, both always and normally, with percentages of 17% and 42%, respectively. The answers “sometimes” and “not very often” had lower percentages, of 31% and 8%, respectively.

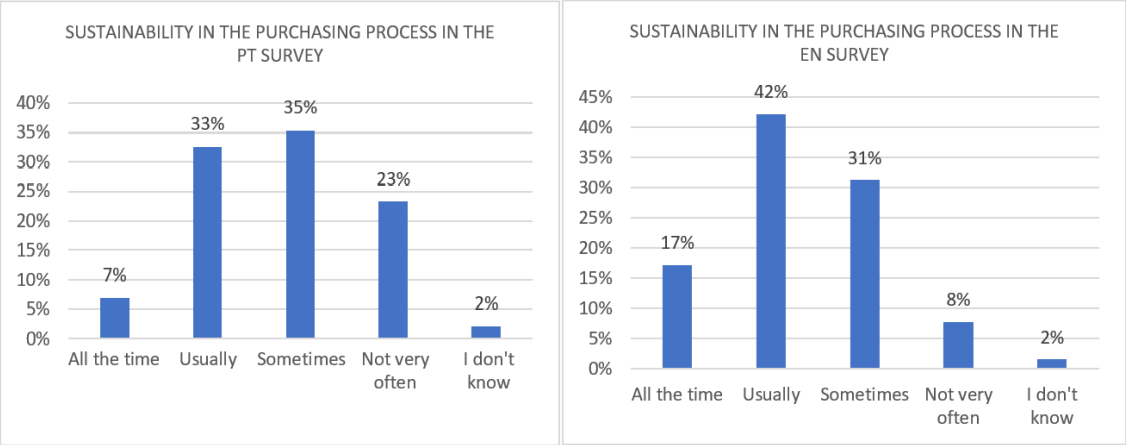


Figure 25 -Sustainability in the purchasing process from the respondents of the survey.

Finally, a direct question was asked, regarding if the respondent bought any product or service that could be considered sustainable, concerning its usual form, in the last 6 months. This dichotomous question allowed the answers "yes" and "no", and the option "I don't know" was also offered, considering that the respondent may not be aware of whether the product purchased was considered sustainable. In addition, respondents were asked to give an example, in an open response, of a sustainable product or service they had recently obtained.

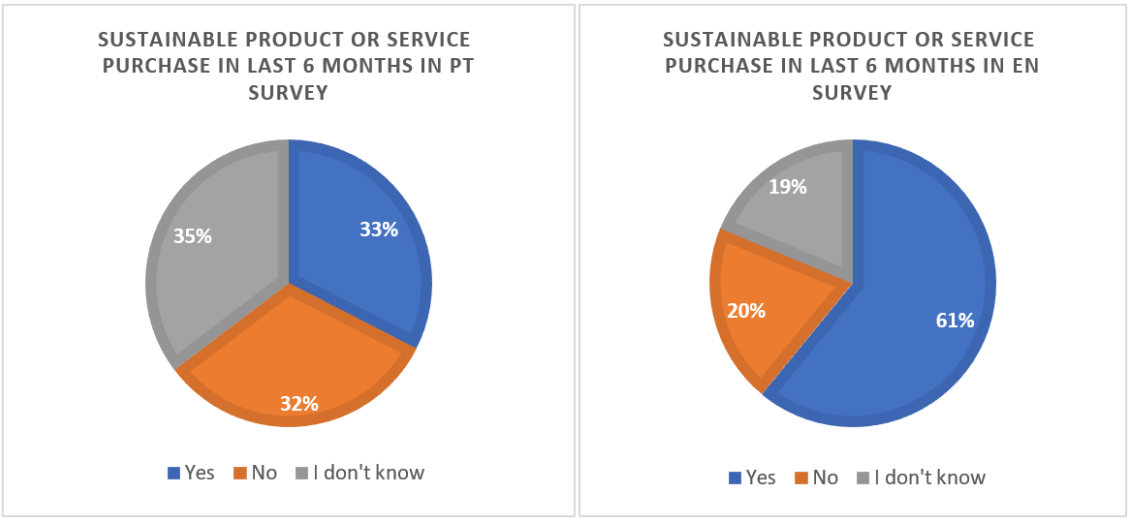


Figure 26 – Sustainable product or service purchased in the last 6 months from the respondents of the survey.

In the Portuguese version, there was no significant difference in the responses, as approximately the same number of respondents answered yes and no (33% and 32%), with 35% responding I don't know to the question of having bought a sustainable product or service compared to its original format. In the questionnaire in English, it was found that 61% of respondents stated that they had purchased a sustainable product or service in the last 6 months, with 20% responding that they did not, and 19% responding "I don't know". Again, the questionnaire in English portrays a target audience more concerned about sustainability and therefore reveals an eco-friendlier purchasing behavior.

4.3. Eco-literacy

Eco-literacy arose from the need to associate know-how in terms of sustainable information to the way it influences willingness to pay for sustainable products and services sold on a marketplace. This parameter was measured through four different questions.

The first question asked respondents if they have any training in the environmental area such as sustainability or circular economy. The survey results in Portuguese show that 67% answered that they do not have any formal training, and only 33% answered that they have training. In contrast, in the English version, there was a high percentage of respondents who stated that they had training in the environmental area (64%), with 36% responding that they did not have such training.

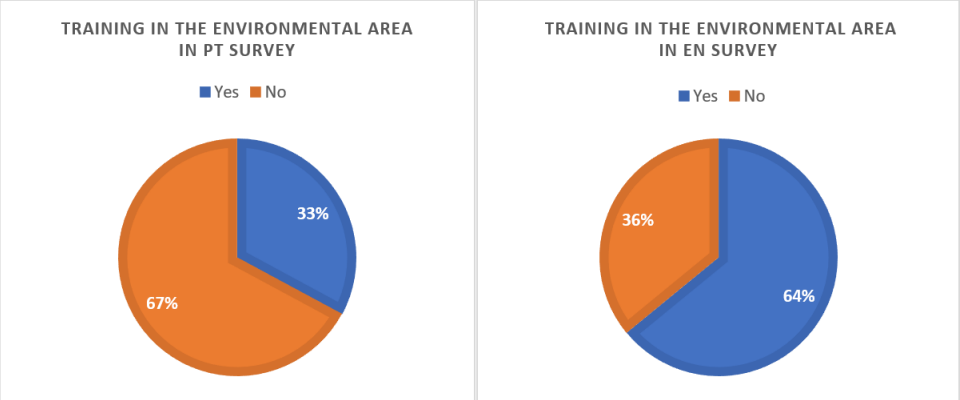


Figure 27 – Training in the environmental area of the respondents from the survey.

The second question asked if they followed any environmental forums, websites, or pages on social media related to sustainability and the environment. The results of the questionnaire in Portuguese were mixed and inconclusive, with half saying yes, and the other half saying no. In the questionnaire in English, it was found that 78% responded that they follow environmental forums, websites, or pages on social media related to sustainability, and 36% said they did not. Again, the asymmetry found between PT and EN versions may be explained by the fact that the English questionnaire was sent to an audience already attending training by a foundation with a strong environmental proclivity.

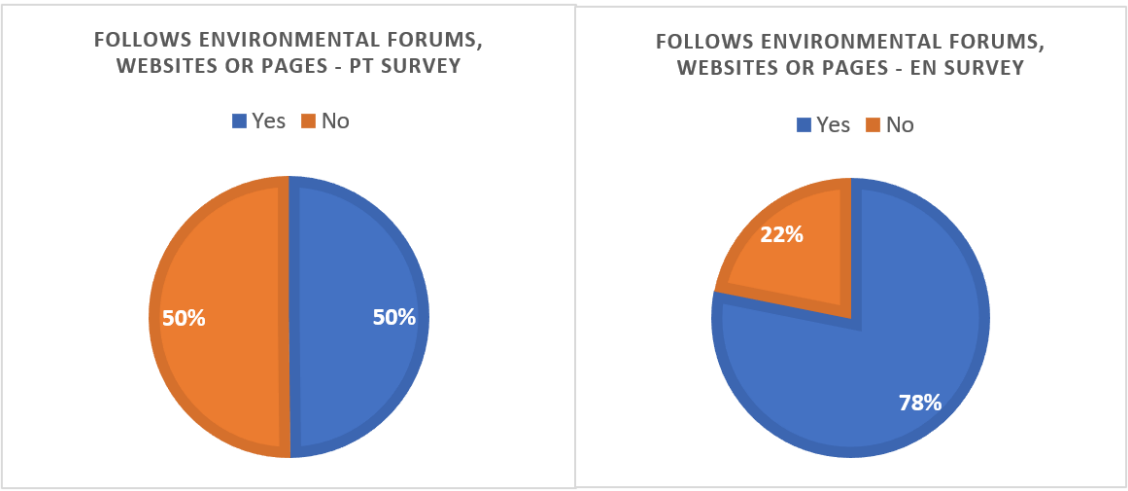


Figure 28 – Habits of respondents from the survey regarding their access to environmental forums, websites, or pages.

In addition to the last questions, respondents were asked about their familiarity and knowledge of environmental problems such as global warming, scarcity of natural resources or habitat destruction, and about environmentally friendly products sold in online marketplaces.

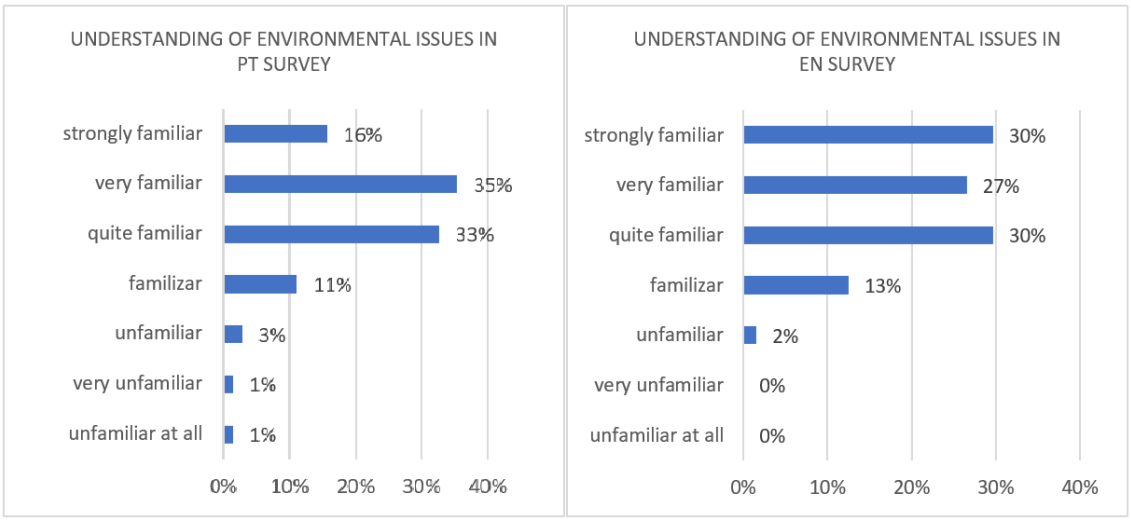


Figure 29 - Understanding of environmental issues from the respondents of the survey.

Respondents responded using a Likert scale, specifying their level of agreement with the previous statements. Overall, respondents presented themselves as having a high knowledge of environmental problems. Regarding the questionnaire in Portuguese, there was a greater predominance of the “very familiar” and “quite familiar” scales. In the questionnaire in English, the last scales represented lower percentages, however, there is a higher percentage of respondents who consider their knowledge and familiarity with environmental problems as "strongly familiar", with 30% of responses, as opposed to the same scale of the questionnaire in Portuguese, with 16%. Again, the left skewness of the results may be explained by the sample bias in the English questionnaire. For the last question, respondents were asked about their knowledge and information regarding environmentally friendly products sold in online marketplaces. The results of this question indicated that in both questionnaires there was a small margin of respondents who considered their knowledge about sustainable products sold in marketplaces to be high to very high, that is, strongly informed or very informed.

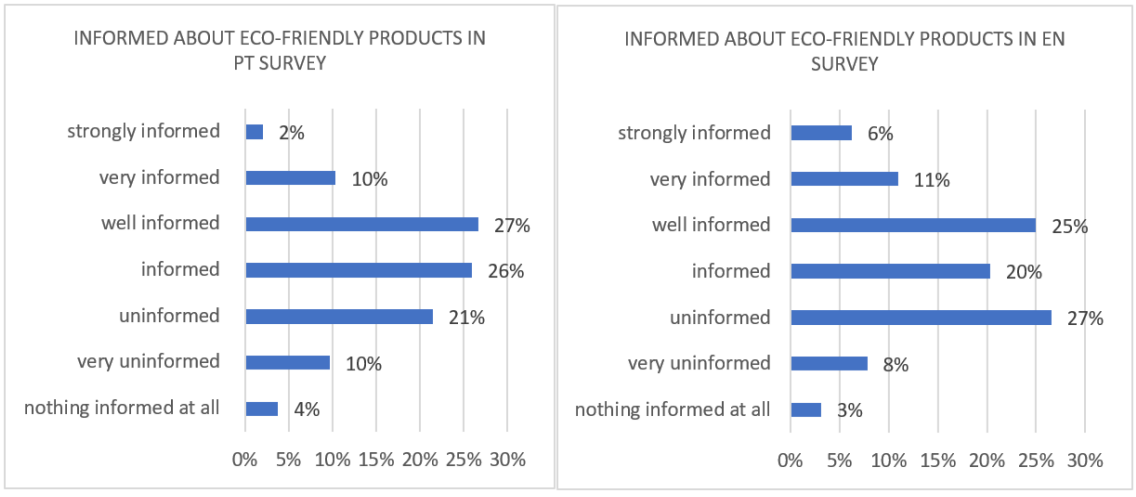


Figure 30 – Information level about eco-friendly products from the respondents of the survey.

There was a greater predominance in the well informed and informed scales, and there were still percentages of 21% and 27% for the PT and EN questionnaires, respectively, of uninformed respondents. This shows that the topic of sustainable marketplaces is still evolving.

4.4. Willingness to Pay

Before calculating the WTP, we first wanted to understand if the target audience sample was biased, that is, if there were demographic factors that influenced the willingness to pay.

An analysis was carried out for the Portuguese questionnaire, through which certain parameters were fixed, to understand whether there is interference with the willingness to pay for sustainable products and services, using the contingent valuation method, which was preferred once it represents a straightforward approach. This analysis is set out in the next section. Considering that the questionnaire in English only obtained 64 responses, this data bias analysis was only carried out for the Portuguese version.

After understanding whether there is interference by some demographic parameters in the sample of respondents to the questionnaire in Portuguese, an analysis was carried out, using the contingent valuation, where respondents with the most common habits of e-commerce and better eco-literacy were considered.

4.4.1. Target Groups

Several questions were asked to characterize the demographics of the respondents, and therefore, several factors could have been considered to create the target groups. However, preference was given to three aspects: gender, age, and income. Research groups were created, with different target audiences, and these target audiences were tested regarding these aspects.

Thus, at an early stage, these parameters were cross-tabulated using Excel, having analyzed the standard deviations of the response values to the direct question of willingness to pay for the example product, that is, the sweater, according to the contingent valuation method, in the questionnaire in Portuguese. There were several differences regarding the standard deviation of the responses, which led to the decision to conduct a more extensive analysis, comparing subgroups to see how responses vary between these groups. The selected groups are displayed in Table 10. The chosen response scales were based on representativeness in the initial sample.

Table 10 - Characterization of the variables considered in the target groups analyzed.

TARGET GROUPS	**GENDER**		**Fixed Variables**	**Non-fixed Variables**
		Income	15 to 30 K €	Male
		Age	Under or 25	Female
	INCOME 1		**Fixed Variables**	**Non-fixed Variables**
		Gender	Male	15 to 30 K €
		Age	Under or 25	30 to 45 K €
	INCOME 2		**Fixed Variables**	**Non-fixed Variables**
		Gender	Female	15 to 30 K €
		Age	Under or 25	30 to 45 K €
	AGE 1		**Fixed Variables**	**Non-fixed Variables**
		Gender	Male	Under or 25
		Income	0 to 15 K €	Over 25
	AGE 2		**Fixed Variables**	**Non-fixed Variables**
		Gender	Female	Under or 25
		Income	0 to 15 K €	Over 25

The main objective of this analysis was to understand how gender, age and income could interfere with the willingness to pay for the sustainable product. Thus, the data was cross-tabulated and filtered according to the fixed and non-fixed variables, and the numerical values of the WTP for each target group were analyzed. The frequency of responses was analyzed, from a scale common to all, which ranged from intervals of 5€, between 20€ and 60€, that is, from prices between 20€ and 25€, 25€ and 30€, and so on.

The purpose was to understand if there was a greater willingness to pay, by varying these parameters. In addition, for each target group, a descriptive statistical data analysis was performed, where the mode was highlighted, that is, the value that occurs most frequently in the data set, to understand the differences concerning WTP between the different groups.

In general, in all groups, there were no major differences regarding the monetary value answered by respondents concerning their willingness to pay, with this value mainly based on 25€, translating a margin of 25% above the original price. However, some factors stand out in this analysis, which may be considered in the future, about the variation of sex, age, and income with the WTP.

In relation to the first group, regarding the gender of respondents, there was the same mode of WTP values, consisting of 25€, with percentages of 67% for men and 57% for women. Despite this, it was noted that within the study group, 42% of women are willing to pay more than 25€, while for men only 33% are willing to pay more than this amount.

Analyzing the groups concerning the level of income, for men (Income 1), there were no differences in terms of their willingness to pay, with the mode of the analyzed values based on 25€. As for women, (Income 2), the same happened, however, it is highlighted that for a higher income, 30 to 45 thousand euros, there were responses from women willing to pay between 35 to 45€ for the sweater, that is, a higher value. The mode, in this case, was 30€.

Then, in terms of age analysis, for the first target group (Age 1), about men, there were no significant differences in the willingness to pay, with the mode being 25€ for ages until 25. Despite this, for ages over 25 the mode of the WTP was 30€, although there were no major differences in the frequency distribution of values of willingness to pay. As for women, while for ages up to 25 years, only 36% of respondents showed a willingness to pay between 25 to 35€ more for the product, and ages above 25 years, 49% of women showed a willingness to pay between 25 and 40€ more for the sustainable sweater, resulting in a WTP value mode of 30€, as opposed to ages up to 25, where the mode was 25€.

This analysis of target groups serves essentially to demonstrate that, although in general, there is still a higher frequency of predisposition up to 25€ for the sustainable product, it is noted that there are older women, with more income, who present a higher WTP.

After having made these considerations, we tried to understand the interference of e-commerce habits and eco-literacy on WTP. Since the questionnaire in English only obtained 64 responses, in addition to already representing a community interested in sustainability with relevant online shopping habits, it was decided not to conduct this analysis in this questionnaire and only to do it in the Portuguese questionnaire. Furthermore, because the results for the jersey are more consistent than the results for the home delivery service, it was decided to evaluate only this target group for the product example. While in the product there was a low margin of people willing to pay less than the original value of the product, in the service there was a significant margin of respondents who would not consider paying more, hence this decision.

Table 11 - Characterization of the variables for the target group relating e-commerce and eco-literacy

	Target Group 1	**Target Group 2**
	Online Shoppers and Eco-literate respondents	Low habits of online shopping and weak characteristics of eco-literacy
Survey Questions	**Fixed Variables**	
10. How often do you shop online products?	Every week; Two to three times a month	Once a month; Once every three months; Once every six months; Never
11. Do you think about sustainability when you are purchasing a product or a service?	All the time; Usually	Sometimes, Not very often; I don't know
12. Have you bought any product or service that could be considered sustainable, in relation to its usual form, in the last 6 months?	Yes	No
14. Do you have any kind of training in the environmental area like sustainability or circular economy?	Yes	No
15. Do you follow any environmental forums, websites, or pages on social media?	Yes	No
16. How familiarized are you with environmental issues, such as global warming, scarcity of natural resources or habitat destruction?	7 - strongly familiar; 6 - very familiar; 5 - quite familiar	4 - familiar; 3 - unfamiliar; 2 - very unfamiliar; 1 - unfamiliar at all
17. How familiarized are you with environmentally friendly products sold in online marketplaces?	7 - strongly informed; 6 - very informed; 5 - well informed	4 - familiar; 3 - unfamiliar; 2 - very unfamiliar; 1 - unfamiliar at all

Thus, a target group was determined, according to which some e-commerce and eco-literacy data were restricted, as shown in Table 11. On the one hand, the WTP of respondents with high e-commerce and eco-literacy habits, and on the other hand, the WTP of respondents with poor online shopping habits and poor environmental knowledge was analyzed.

Regarding the data obtained, it is important to highlight that after all the restrictions made, the values obtained for WTP were just a few data points, which may affect the representativeness of the sample. Also, the income should have been controlled. However, when it was tried to fix the income value, the results obtained by fixing it between 15 k € and 30 k €, for the targe group 1, were very few (only two), with dispersing values. This led us to exclude the analysis controlling this variable. However, income is important, for instance, the group with more Eco literacy may have less income, and so has less willingness to pay, despite caring about environmental issues.

It was found that the group of respondents from Online Shoppers and Eco-literate respondents (target group 1) presented greater representation in the frequency of monetary values of the WTP corresponding to 25€, which is its mode in terms of

descriptive analysis. Of the seven respondents evaluated, 43% answered this value, corresponding to the highest sample percentage.

In contrast, for the group of low online purchases and eco-literacy (target group 2) there was a greater dispersion in terms of results, with responses ranging between 20€ and 25€, with a percentage of 71%, and a percentage of 29% who responded that they would be willing to pay up to 30€ for the product. Despite these considerations, the mode value of this group was 30€.

It would be expected that the population with e-commerce and eco-literacy habits, aware of the sustainable product, would be willing to pay more. But in fact, this population segment has lower values than non-online and non-Eco literate respondents.

These results allow us to define two hypotheses. On the one hand, they demonstrate that people who have good e-commerce habits and good environmental knowledge will be able to make their decision more consciously with their WTP. On the other hand, the target group with bad e-commerce habits and poor environmental knowledge responded with less awareness of their willingness to pay. However, again, we cannot ignore the income factor, as it could have importance once what was said previously, so this type of analysis could be done in the future when we have more results.

4.4.2. CV method

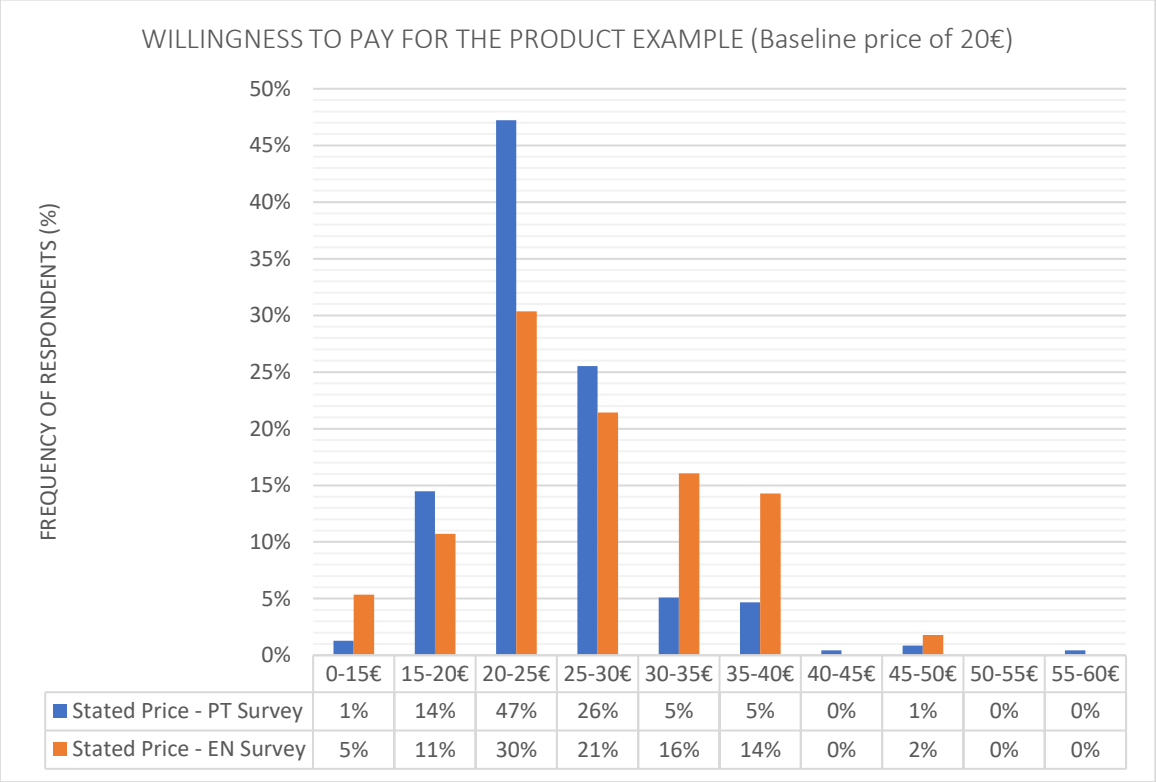
By identifying the frequency of responses from different ranges of values, it was possible to perceive the range most frequent, thus representing the general result of the willingness to pay for the product or sustainable service. To treat the data more practically, and to be able to make a point of comparison, the results of the price ranges of this method were plotted on the same graph, as a function of the percentage of respondents who responded from the given categories.

Product

About the WTP evaluation in the PT survey, the numerical values were analyzed concerning their frequency of response, with intervals of 5€, between 1 to 60€. The baseline price of the normal sweater was 20€. Regarding the results of the questionnaire in Portuguese, about the direct question of willingness to pay for the shirt, it was found that almost half of the respondents' answers (47%) were between 20€ and 25€, and 26% of respondents replied to a predisposition between 25€ and 30€, with the remaining ranges of values being insignificant.

Given the significant percentage between 20-25€, and 25-30€, to understand if there is any distribution between prices in these ranges, the frequency analysis was

repeated, amplifying it between the integer values included in these intervals. This was not the case, with only 13% responding to other values in the range of 20€ to 25€ (exclusive), and 2% responded to values in the range of 25€ to 30€.



	0-15€	15-20€	20-25€	25-30€	30-35€	35-40€	40-45€	45-50€	50-55€	55-60€
Stated Price - PT Survey	1%	14%	47%	26%	5%	5%	0%	1%	0%	0%
Stated Price - EN Survey	5%	11%	30%	21%	16%	14%	0%	2%	0%	0%

Figure 31 - Product example Stated prices as a function of the frequency of respondents for both surveys.

Additionally, a descriptive analysis of the data was carried out, emphasizing the value of the mode, which mostly appeared in the sample, which was 25€. In this sense, it is possible to conclude that for the target audience of the questionnaire in Portuguese, there is a greater willingness to pay for the sustainable product between 20€ to 25€, translating into a price increase of around 25%.

Regarding the product WTP evaluation in the EN survey, concerning the direct question of willingness to pay for the shirt, it was found that most of the respondents (30%) stated that they would be willing to pay between 20€ and 25€ for the sweater. In addition, 21% of respondents respond to a predisposition between 25€ and 30€, with some remaining ranges of values being quite significant, as it is in the range of 30€ to 35€ with 16%, and 35€ to 40€, with 14% of the sample. As before, and to avoid misinterpretations, the frequency analysis was repeated, amplifying it between the integer values included in these intervals, to understand if there would be greater representation in another monetary value. This was also not the case, with only 6% responding to other values in the range of 20€ to 25€ (exclusive), and 0% responded to values in the range of 25€ to 30€ (exclusive).

Additionally, a descriptive analysis of the data was carried out, emphasizing the value of the mode, which mostly appeared in the sample, which was also 25€. In this sense, it is possible to conclude that for the target audience of the questionnaire in English, there is a greater willingness to pay for the sustainable product between 20€ to 25€, translating into a price increase of around 25%.

Although the main results are similar in both questionnaires, it should be noted that, as can be seen from Figure 32, there is a greater number of responses in the ranges above 25€ by respondents to the questionnaire in English, in comparison with the answers in Portuguese. This is reflected in the demographic characteristics of respondents, since in the survey in EN there are more workers, with more e-commerce habits, higher income, and more eco-literate.

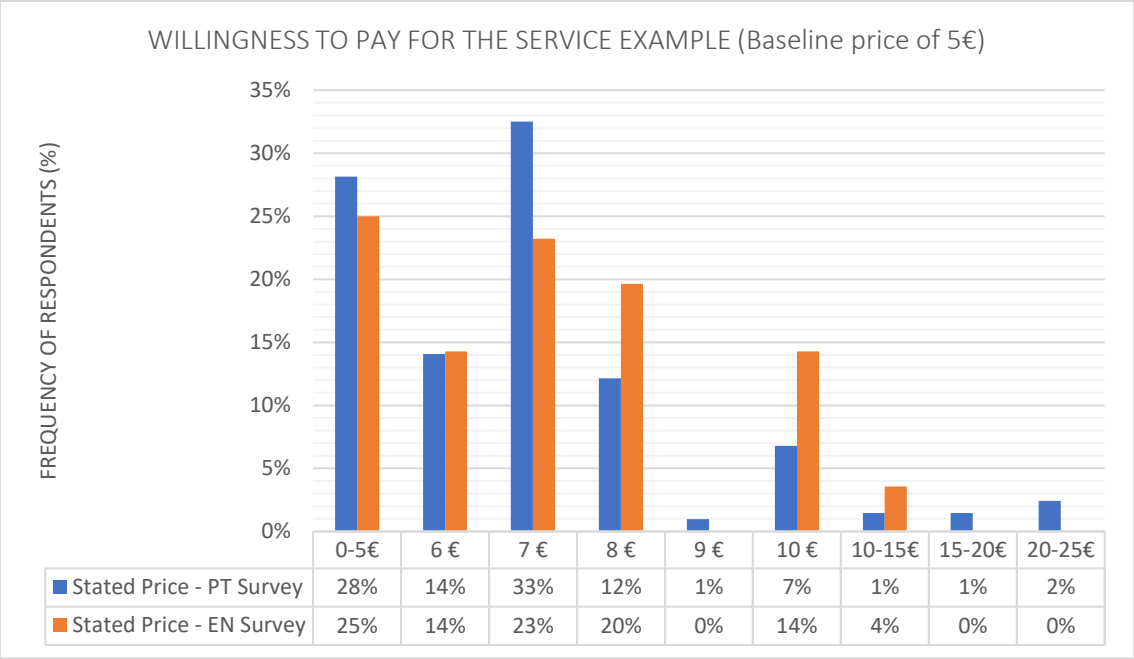
In addition, it should be noted that there is a population group, in both questionnaires, who is not willing to pay more for the shirt, representing a percentage of respondents of 15% for the questionnaire in Portuguese, who answered values monetary values up to 20€, and a percentage of respondents of 16% in the questionnaire in English, who answered monetary values in the same range.

Service

Regarding the results of the questionnaire in Portuguese, it was initially found that more than half of the respondents (67%) said they would be willing to pay between 5€ and 10€, and 28% of them would be willing to pay less than 5€. Also, in the questionnaire in English, it was found that 71% of respondents are willing to pay between 5€ and 10€ more for the sustainable service, and 25% would not be willing to pay more than 5€.

Thus, the frequency analysis was repeated for the WTP results of both questionnaires, amplifying it between the integer values included in these intervals, to understand if there would be greater representation in another monetary value. It was found that there is an important variance between 5€ and 10€ for both questionnaires, so it was decided to adapt their scale graphically, for a better analysis of the results.

About the service WTP evaluation in the PT survey, the numerical values were analyzed concerning their frequency of response, with intervals of 5€, between 1 to 25€. The baseline price of the normal service was 5€. Carrying out a new analysis, to the PT survey, it was understood that the highest percentage of respondents corresponds to a price of 7€, with 33%, followed by an equally significant percentage of 28% who are not willing to pay more than 5€, as noted before. Also noteworthy are some results in prices of 6€ and 8€, with 14% and 12% of respondents, respectively. For the PT survey, the mode of the WTP for the service was 7€.



	0-5€	6 €	7 €	8 €	9 €	10 €	10-15€	15-20€	20-25€
Stated Price - PT Survey	28%	14%	33%	12%	1%	7%	1%	1%	2%
Stated Price - EN Survey	25%	14%	23%	20%	0%	14%	4%	0%	0%

Figure 32 - Service example: stated prices as a function of the frequency of respondents for both surveys

In this sense, it is possible to conclude that for the target audience of the questionnaire in Portuguese, there is an average willingness to pay for the sustainable service, translated in an optimal point, corresponding to 7€, which corresponds to an increase in the price of 40%.

Regarding the service WTP evaluation in the EN survey, it was found that there is a higher percentage of respondents (25%) who would not be willing to pay more than €5 for the service with sustainable characteristics. This value is followed by the 7€ price, to which 23% of respondents replied, and subsequently the 8€ price with 20% of the responses. Regarding the mode value obtained through the descriptive analysis of the data, a WTP for the service of 7€ was also obtained.

In this sense, it is possible to conclude that for the target audience of the questionnaire in English, there is an average willingness to pay for the sustainable service of 7€, which corresponds to an increase in the price of 40%.

4.4.3. PSM method

It should be noted that the evaluation of the PSM method was not included in this dissertation regarding the example service. This happened due to the scale used and the frequency distributions of responses, which did not fit with the application of the method, either in the tabulation of the data through which an exact relationship was not verified in the measurement of the optimal price for a maximum profit, or in the graphical representation of the curves that resulted in incoherent and inconclusive graphs.

On the one hand, the PSM method allowed to see the range of values for which people are more likely to pay, in addition to the maximum profit margin, corresponding to a certain market price at which the product or service must be placed on the marketplace. On the other hand, through the graphic realization of the PSM curves diagrams, it is possible to identify several price thresholds, with the OPP and the PME being chosen to study this thesis.

The Van Westendorp Price Sensitivity Meter was used to identify two price thresholds, the Optimal Price Point (OPP) and the Point of Marginal Expensiveness (PME). This way, needing to obtain these intersection points, three questions were applied: Priced so cheaply that the respondent would question its quality (Too cheap); priced so expensively that the respondent would not buy it (Too expensive); a bargain (inexpensive/cheap).

At this stage, the results of the survey conducted in Portuguese are shown. A descriptive tabulation of the data was carried out, based on the following steps and characteristics.

The first question asked about at what price the product or service would be so inexpensive that the respondent would doubt its quality. This trait represents the too cheap margin, from which we can represent a minimum price, which was tabulated according to a scale from 5€ to 30€, with intervals of 5€, according to the frequency of responses.

Table 12 - Tabulation of Too Cheap margin data for PSM Analysis in PT Survey.

Minimum price (€)	Frequency	Percentage (%)	Cumulative Percentage (%)
5 €	46	20%	20%
10 €	94	40%	60%
15 €	47	20%	80%
20 €	37	16%	95%
25 €	7	3%	98%
30 €	4	2%	100%

According to Table 12, the first column represents minimum prices. These are the prices that different people have written down in terms of their minimum willingness to pay. The price below which they would question the quality of the object.

Regarding the second question, it asked about what price the product or service would be so expensive that it wouldn't be worth it, that it is, at what price it would be too high, that the respondent wouldn't be paying that amount of money. This trait represents the too expensive margin, from which we can represent a maximum price, which was

tabulated according to a scale from 5€ to 100€, with intervals of 5€, according to the frequency of responses.

According to Table 13, the first column represents maximum prices.

Table 13 - Tabulation of Too Expensive Margin Data for PSM Analysis in PT Survey,

Maximum price (€)	Frequency	Percentage (%)	Cumulative Percentage (%)
25 €	15	6%	7%
30 €	62	26%	33%
35 €	27	11%	45%
40 €	47	20%	65%
45 €	8	3%	68%
50 €	51	22%	90%
55 €	0	0%	90%
60 €	8	3%	93%
65 €	1	0%	94%
70 €	7	3%	97%
75 €	0	0%	97%
80 €	4	2%	98%
85 €	0	0%	98%
90 €	1	0%	99%
95 €	0	0%	99%
100 €	3	1%	100%

After this analysis, we had how many people think the price is too low, and how many people think the price is too high. Then, this information was combined in a way that helped get the overall population's willingness to pay. This way, both cumulative frequencies were integrated into the same table, about the same price scale, and one was subtracted from the other. This means that now it is possible to identify the prices that are acceptably low but not too high. These prices are represented in the column of the percentage willing to pay the specified price.

As we can see from Table 14, about the PT survey, 91 to 95% of the target population finds that a range from 20€ to 25€ is not too low, that they would consider the quality poor and not too high, that they would not be willing to pay that price. The maximum of the percentage willing to pay the specified price occurs between 20€ and 25€. These values agree with the conclusions of the contingent valuation method.

Table 14 - Tabulation of Percentage data willing to pay the specified price for PSM Analysis in PT Survey.

Price (€)	Percentage who thinks the price is not too low	Percentage who thinks the price is too high	Percentage willing to pay the specified price
5	20%	0%	20%
10	60%	0%	60%
15	80%	0%	80%
20	95%	0%	95%
25	98%	7%	91%
30	100%	33%	67%
35	100%	45%	55%
40	100%	65%	35%
45	100%	68%	32%
50	100%	90%	10%
55	100%	90%	10%
60	100%	93%	7%
65	100%	94%	6%
70	100%	97%	3%
75	100%	97%	3%
80	100%	98%	2%
85	100%	98%	2%
90	100%	99%	1%
95	100%	99%	1%
100	100%	100%	0%

However, to further analyze the data, we must consider that finding the people's willingness to pay ignores issues of how much it costs to make the product or service. It is relevant to enter in costs at this point. By re-plotting the percentage willing to pay the specified price, it was added a column with an assumed production cost of 5€, being five all the way down once the cost doesn't change relative to the price.

After this, the margin was calculated, which was made by taking the price that was going to be charged and subtracting the overall cost. Finally, it was obtained the profit, in the final column, calculated by taking this margin information and multiplying it by the cumulative percentage of people that would accept that individual price. After this, it was found the optimal profit, that is, the maximum value of profit which corresponds to a determined price value that must be applied in the market, to maximize revenues. It was concluded that this value corresponds to 25€, corresponding to a profit of 18.26€.

Table 15 - Determination of the market price corresponding to a maximum profit in PT Survey.

Price (€)	Cumulative Percentage (%)	Cost	Margin	Profit
5	20%	5	0	0.00
10	60%	5	5	2.98
15	80%	5	10	7.96
20	95%	5	15	14.30
25	91%	5	20	18.26
30	67%	5	25	16.70
35	55%	5	30	16.60
40	35%	5	35	12.36
45	32%	5	40	12.77
50	10%	5	45	4.60
55	10%	5	50	5.11
60	7%	5	55	3.74
65	6%	5	60	3.83
70	3%	5	65	2.21
75	3%	5	70	2.38
80	2%	5	75	1.28
85	2%	5	80	1.36
90	1%	5	85	1.09
95	1%	5	90	1.15
100	0%	5	95	0.00

Finally, it was analyzed the cheap/bargain margin and for that, another descriptive tabulation of the data was carried out, according to the same principles expressed above. This way, the answers of the respondents, regarding the price they would consider the product to be a great buy for the money given and the environmental impact avoided, were tabulated, according to their frequency, percentage, and cumulative percentage.

Table 16 - Tabulation of the optimal prices (cheap/bargain) for PSM Analysis in PT Survey.

Optimal price (€)	Frequency	Percentage (%)	Cumulative Percentage (%)
5	1	0%	0%
10	2	1%	1%
15	19	8%	9%
20	68	29%	38%
25	85	36%	74%
30	41	17%	92%
35	11	5%	97%
40	6	3%	99%
45	2	1%	100%
50	0	0%	100%
55	0	0%	100%
60	0	0%	100%

After determining the profit-maximizing market price, it was sought to determine the intersection points according to the Price Sensitivity Meter. The answers of the PT survey participants, regarding the different questions made, were plotted in a graph. The X-axis shows the prices, while the Y-axis shows the percentage of consumers who quoted the respective price, i.e., the cumulative frequency.

By crossing the cumulative frequencies for the three price categories chosen, that is: priced so cheaply that the respondent would question its quality (Too cheap); priced so expensively that the respondent would not buy it (Too expensive); a bargain (inexpensive/cheap), it is possible to obtain interpretive traits.

Before this, however, the values of the two curves were reversed. The cumulative frequency data corresponding to the minimum price (Too cheap) and the optimal price (cheap/bargain) was inverted and plotted with the cumulative frequency data from the maximum price (too expensive). This way, two intersection points were obtained. Through the representation of the three curves on the same graph, the points at which these curves intersect represent actual results of the Van Westendorp Price Sensitivity Meter.

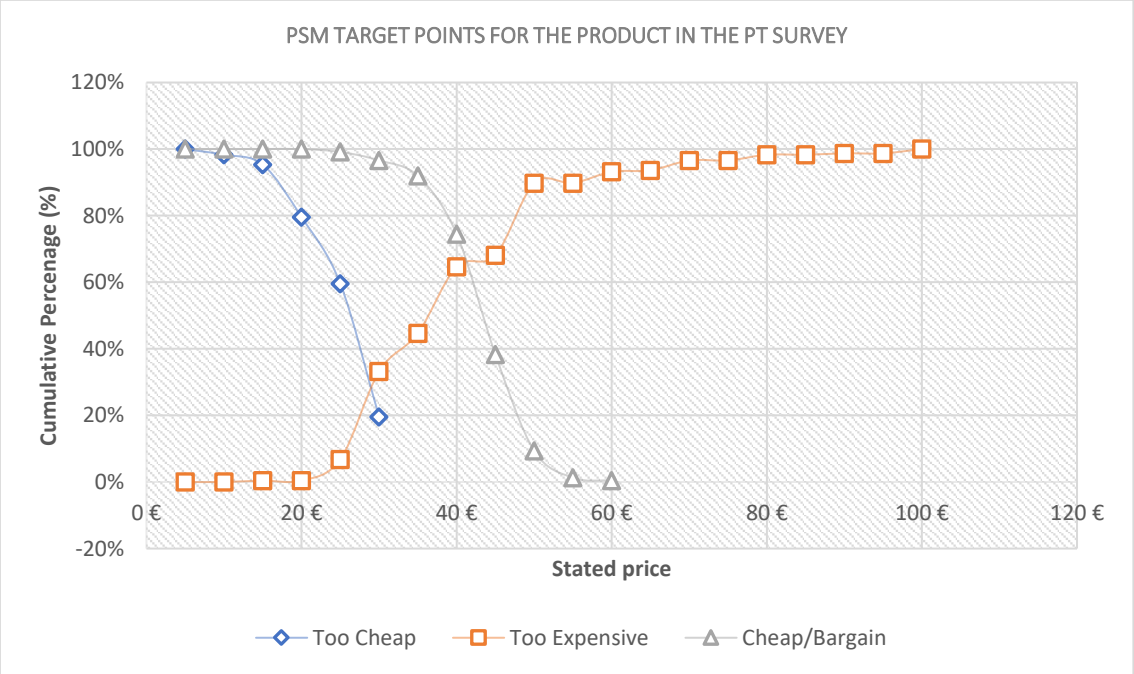


Figure 33 - Scatterplot of cumulative frequencies for product WTP questions in the PT survey

As we can see in the graph of Figure 33, the intersection of the curves "too expensive" and "too cheap" represents the "Optimal Price Point". In this case, the OPP is between 25€ and 30€, which is quite like the results obtained from tabulating the data previously. In addition, the intersection of "too expensive" and "cheap" (not expensive) is considered as the upper bound of an acceptable price range, which is the "point of marginal expensiveness". This point corresponds to around 40€ and can be seen as the

price point where cost becomes a major concern, and where customers often feel that the price of the product/service outweighs the benefit.

Concerning the survey conducted in English, all the above assumptions were considered, and for practical purposes, only the tables are highlighted, as well as the intersection points graph, with the main conclusions. The same scales and value ranges were used, according to the frequency of responses.

Table 17 - Tabulation of Too Cheap margin data for PSM Analysis in EN Survey.

Minimum price (€)	Frequency	Percentage (%)	Cumulative Percentage (%)
5	9	16%	16%
10	16	29%	45%
15	12	22%	67%
20	13	24%	91%
25	4	7%	98%
30	1	2%	100%

Table 18 - Tabulation of Too Expensive Margin Data for PSM Analysis in EN Survey.

Maximum price (€)	Frequency	Percentage (%)	Cumulative Percentage (%)
25	5	9%	9%
30	9	16%	25%
35	6	11%	36%
40	9	16%	52%
45	1	2%	54%
50	10	18%	71%
55	1	2%	73%
60	7	13%	86%
65	0	0%	86%
70	3	5%	91%
75	0	0%	91%
80	3	5%	96%
85	0	0%	96%
90	1	2%	98%
95	0	0%	98%
100	1	2%	100%

Table 19 - Tabulation of Percentage data willing to pay the specified price for PSM Analysis in EN Survey

Price (€)	Percentage who thinks the price is not too low	Percentage who thinks the price is too high	Percentage willing to pay the specified price
5	16%	0%	16%
10	45%	0%	45%
15	67%	0%	67%
20	91%	0%	91%
25	98%	9%	89%
30	100%	25%	75%
35	100%	36%	64%
40	100%	52%	48%

45	100%	54%	46%
50	100%	71%	29%
55	100%	73%	27%
60	100%	86%	14%
65	100%	86%	14%
70	100%	91%	9%
75	100%	91%	9%
80	100%	96%	4%
85	100%	96%	4%
90	100%	98%	2%
95	100%	98%	2%
100	100%	100%	0%

As we can see from Table 19, about the EN Survey, 89% to 91% of the target population finds that a range from 20€ to 25€ is not too low, that they would consider the quality poor and not too high, that they would not be willing to pay that price. The maximum of the percentage willing to pay the specified price occurs between 20€ and 25€. These values agree with the conclusions of the contingent valuation method.

Entering in costs for the EN survey results regarding the WTP measurement for the product example, the optimal profit, that is, the maximum value of profit, 18.57€, corresponds to a price of 35€ which must be applied in the market, to maximize revenues.

Table 20 - Determination of the market price corresponding to a maximum profit in EN Survey.

Price (€)	Cumulative Percentage (%)	Cost	Margin	Profit
5	16%	5	0	0.00
10	45%	5	5	2.27
15	67%	5	10	6.73
20	91%	5	15	13.64
25	89%	5	20	17.84
30	75%	5	25	18.75
35	64%	5	30	19.29
40	48%	5	35	16.88
45	46%	5	40	18.57
50	29%	5	45	12.86
55	27%	5	50	13.39
60	14%	5	55	7.86
65	14%	5	60	8.57
70	9%	5	65	5.80
75	9%	5	70	6.25
80	4%	5	75	2.68
85	4%	5	80	2.86
90	2%	5	85	1.52
95	2%	5	90	1.61
100	0%	5	95	0.00

Table 21 - Tabulation of the optimal prices (cheap/bargain) for PSM Analysis in EN Survey.

Optimal price (€)	Frequency	Percentage (%)	Cumulative Percentage (%)
5	1	2%	2%
10	1	2%	4%
15	9	16%	20%
20	12	21%	41%
25	16	29%	70%
30	13	23%	93%
35	3	5%	98%
40	1	2%	100%
45	0	0%	100%
50	0	0%	100%
55	0	0%	100%
60	0	0%	100%

To determine the intersection points according to the Price Sensitivity Meter, as we can see in the graph of Figure 34, the intersection of the curves "too expensive" and "too cheap" represents the "Optimal Price Point". In this case, the OPP is about 30€, which is quite like the results obtained from tabulating the data previously.

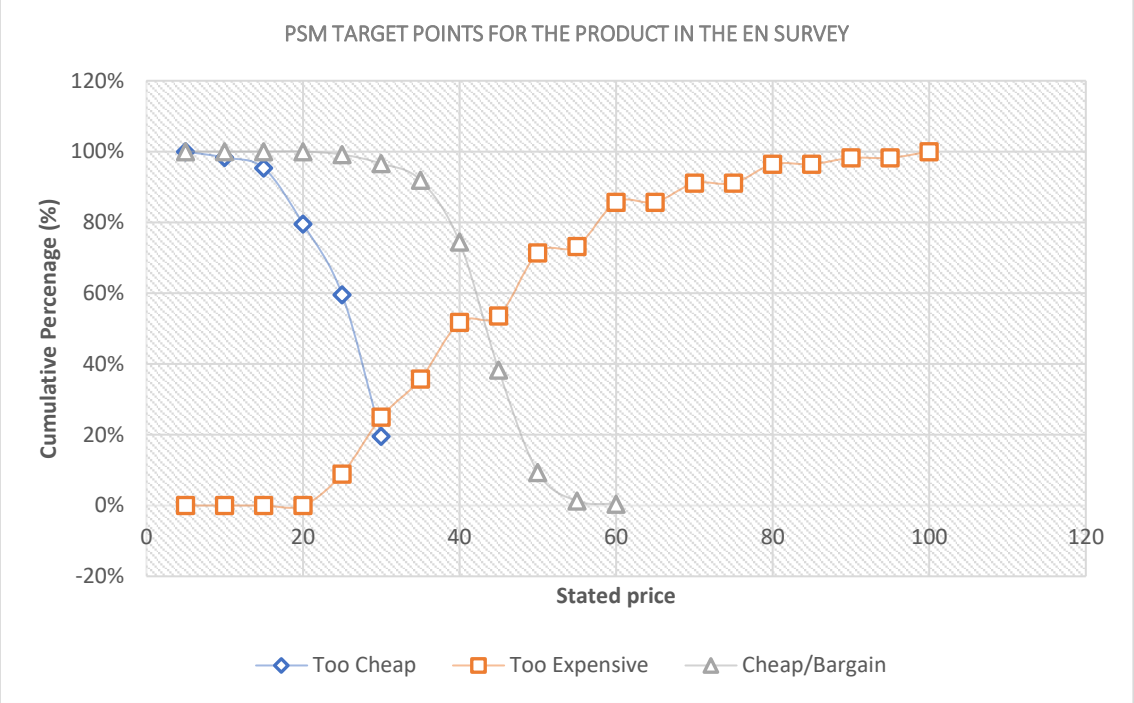


Figure 34 - Scatterplot of cumulative frequencies for product WTP questions in the EN survey

In addition, the intersection of "too expensive" and "cheap" (not expensive) is considered as the upper bound of an acceptable price range, which is the "point of marginal expensiveness". This point corresponds to around 42€ and can be seen as the

price point where cost becomes a major concern, and where customers often feel that the price of the product/service outweighs the benefit.

4.5. Sustainable Marketplace

The last questions of the questionnaire focused on the perceived utility of a sustainable marketplace such as MyGreenApp. This assessment was made through four different questions.

The first question asked the respondents to answer using a Likert scale how much they would be willing to pay for sustainable products and services, gathered on a Sustainable Marketplace, being 1 wouldn't give more money (strongly disagree) and 7 would accept a reasonable price for the marketplace service (strongly agree).

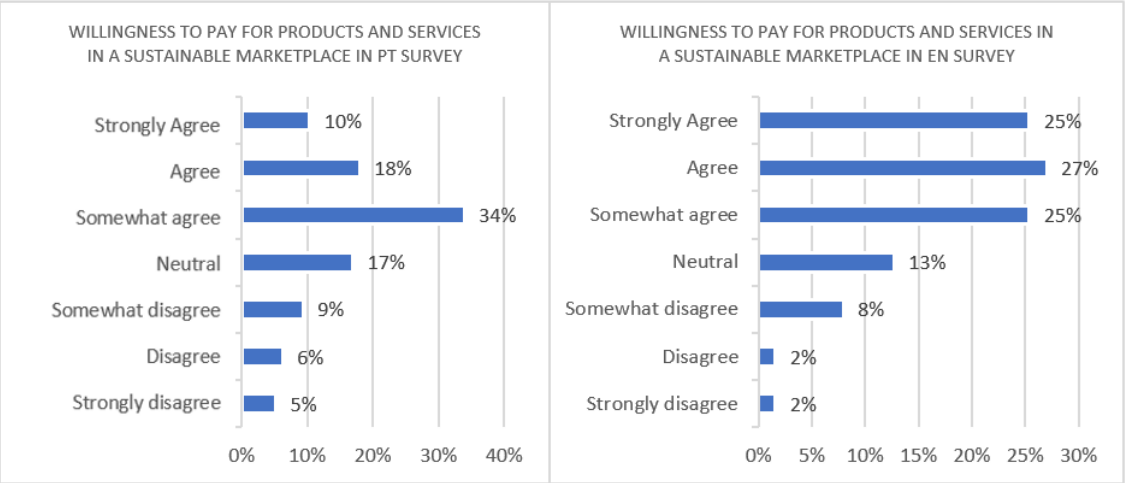


Figure 35 – Willingness to pay for products and services in a sustainable marketplace from respondents to the survey.

The results of the Portuguese survey show that 34% of respondents partially agree with paying more for sustainable products and services combined in a sustainable marketplace, followed by 18% who agree and 10% who fully agree. Regarding the questionnaire in English, there is a higher percentage of respondents in the high range of agreement, that is, 25% strongly agree with the extra payment for sustainable products and services in the market, 27% agree, and 25% somewhat agree.

The second question asked respondents what price range they would consider reasonable for the green premium of a sustainable product or service to be sold on a sustainable marketplace.

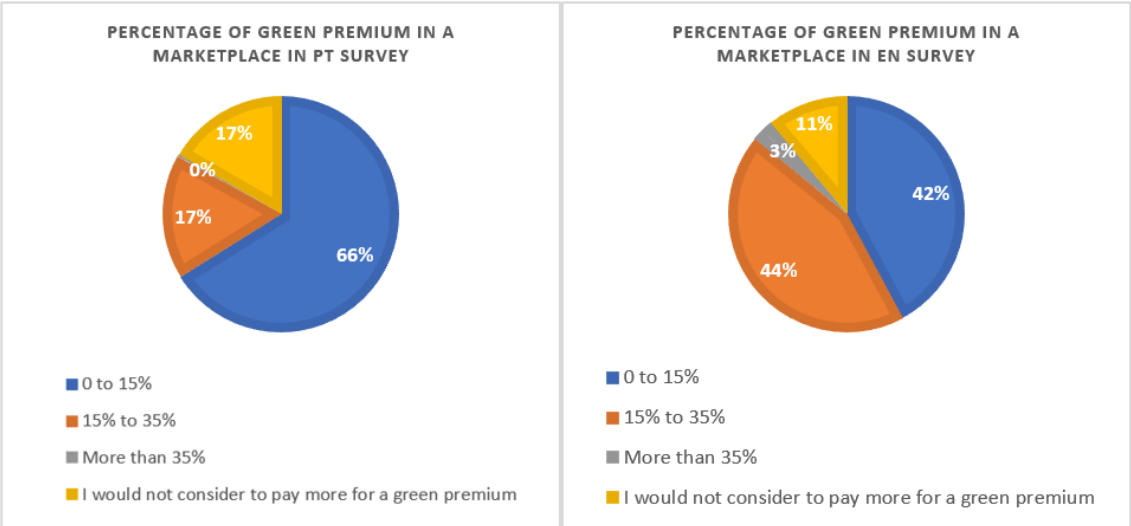


Figure 36 – Percentage of green premium in a marketplace.

In the questionnaire in Portuguese, the results showed that there is a greater willingness to pay up to 15% green premium, with 66% of respondents responding, followed by 17% who considered paying between 15% to 35% of the green premium. It was also found that 17% of respondents would not consider paying more for a green premium for a product or service sold on an online marketplace. Regarding the questionnaire in English, it was found that there is a higher percentage willing to pay between 15% and 35% of green premiums (44%), followed by 42% who said they considered a premium between 0 and 15% to be reasonable. There was a smaller percentage of people who would not be willing to pay more, and still 3% who claimed to pay more than 35% of the premium value.

The third question asked the respondents whether they would find a carbon footprint tool helpful for informing them on the products and services sold in a marketplace. In both questionnaires, it was found that respondents recognized the importance of this parameter, and in the questionnaire in Portuguese, 45% fully agreed with the relevance of the carbon footprint measurement tool at the time of purchase, followed by 24% and 16 % who agreed and partially agreed. Regarding the questionnaire in English, half of the respondents said they strongly agree with the tool, followed by 27% who said they agree.

Finally, the last question asked the respondents if they would find social media helpful, which would allow them to get people's feedback on products and services sold in a sustainable marketplace.

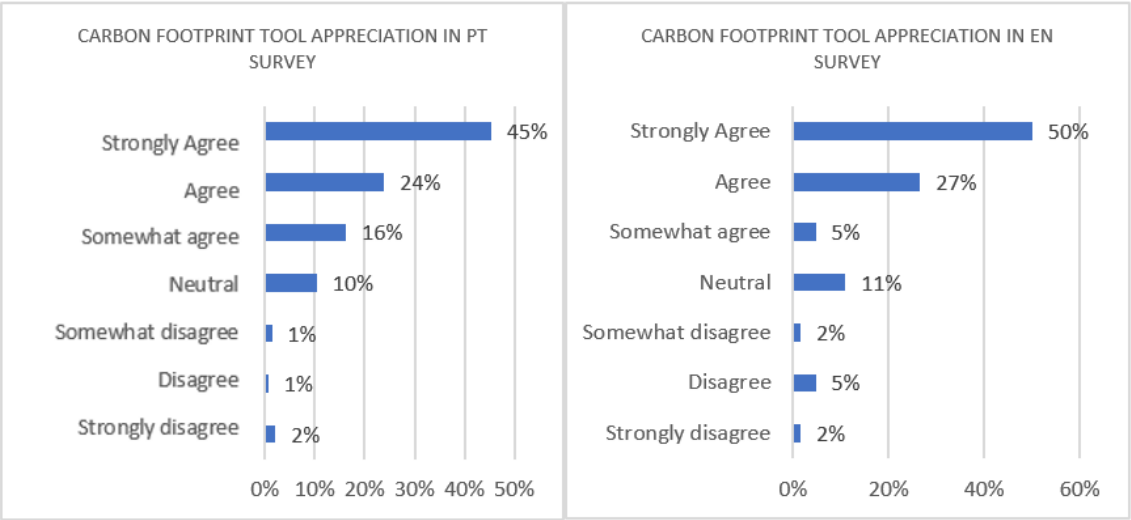


Figure 37 – Appreciation of the carbon footprint from the respondents of the survey.

In both questionnaires, it was found that respondents also recognized the importance of the social network in the context of MyGreenApp and the sustainable marketplace. In the questionnaire in Portuguese, 32% of respondents said they fully agreed, 22% agreed and 18% partially agreed. In the questionnaire in English, 38% of respondents said they totally agreed, followed by 33% who said they agreed with the importance of the social network.

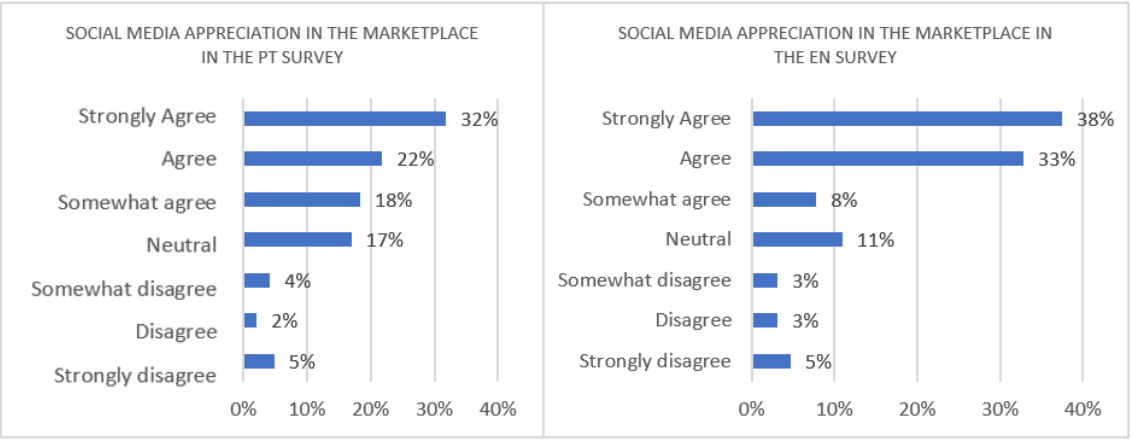


Figure 38 – Social media appreciation in the marketplace for both surveys.

5. Conclusions

The main goal of this work was to assess the willingness to pay for sustainable products and services sold on an online marketplace. Through the literature review carried out, it was stated that fashion products and transport services can be considered of high commercial and environmental importance, both for their prominence in the market and for their prominence in terms of environmental impacts. The market study carried out allowed us to understand how there is demand for a business like MyGreenApp in the market. Ethical and sustainable brands were searched on the market, and distinguished from their categories, having the study revealed how sustainable fashion is on the rise and can be a good initial investment opportunity. The transport sector was recognized because of its pollution and gases emitted into the atmosphere when traveling to serve the customer who placed a certain order, and mainly because of the characterization of sustainable or unsustainable packaging. In addition, the literature review allowed us to understand how demographic characteristics, such as education, environmental knowledge (eco-literacy), and customer participation, influence the willingness to pay for some examples of products or services.

Thus, it was decided to conduct two online surveys, with the same structure, one in Portuguese and another in English. Undertaking two questionnaires was seen with sample relevance, in that two distinct target audiences were obtained, and thus the results of the measurement of willingness to pay could be related to demographic characteristics that differ essentially in the country of origin, income, age, in the professional situation, e-commerce habits and eco-literacy. The questions used in the survey had the objective, of characterizing the demographic sample of both target audiences, and, on the other hand, assessing how e-commerce habits and eco-literacy impact the WTP.

Regarding demographic characteristics, the main differences in both questionnaires were that the PT survey obtained answers from younger respondents, up to 25 years old, while the EN survey obtained more responses from ages 26 to 35 years old. As for the professional situation, the PT survey obtained both students and workers, while the English survey obtained mainly workers. As for the level of education, both surveys represented a greater predominance of respondents with a level of education corresponding to the master's degree.

As for e-commerce habits, it was found that in the English survey, there was a higher frequency of online purchases of products, every week, and two to three times a month, compared to lower values in the PT survey. Furthermore, also for the

questionnaire in English, it was noted that international respondents attributed greater relevance to sustainability in the process of purchasing a product or service. Regarding the purchase of a sustainable product or service, concerning its base form, there was a higher percentage of respondents in the EN survey who answered yes, compared to the PT survey, where the results were more inconclusive.

As for eco-literacy, the results were also different. In terms of training in the environmental or similar area, there was a higher percentage of respondents to the EN survey, compared to the PT survey, which claimed to have such training. As for the monitoring of online environmental pages by respondents, the EN questionnaire obtained a greater number of positive responses. To assess eco-literacy, two questions were asked highlighting awareness of environmental problems, with a stronger familiarization in the survey in English. Furthermore, the knowledge of environmental products and services sold on the marketplace, revealed moderate understanding in both questionnaires, denouncing the evolving market need for this topic.

As far as the WTP evaluation is concerned, the contingent valuation methods and the Van Westendorp Sensitivity Meter question methods allowed us to draw interesting conclusions. As for the contingent valuation, general results and results referring to target groups defined for age, gender, income, e-commerce habits, and eco-literacy were done. These target groups were exclusively analyzed for the survey in Portuguese and the case of the product example.

Thus, for demographic variation target groups, we observed no major differences regarding the median value of the WTP for the shirt, which was based around 25€, translating a margin of 25% above the original price.

However, some factors stood out in this analysis, with the variation of gender, age, and income with the WTP. Regarding the gender of respondents, it was noted that within the study group, there is more woman than men willing to pay more than 25€ for the sweater example. As for income, while in men no relevant differences were detected, for women with a higher income (30 to 45K €), responses were willing to pay more than 35€ for the sweater. This might be related to the fact that most actual sustainable markets have more products for which the target market is women. In terms of age analysis, both men and women exhibited no significant differences in the willingness to pay, nevertheless, while the average WTP for ages until 25 was 25€, for ages over 25, it was 30€. This might be justified by the purchasing power of older respondents (working ones), and by their experience or knowledge.

Regarding the interference of e-commerce habits and eco-literacy in WTP, it was found that within the group of Online Shoppers and Eco-literate respondents, most of them were willing to pay 25€ for the product. For the group of low online purchases and

low eco-literacy, it was not verified a consistency among results, as respondents were willing to pay between 20€ to 30€ for the product. It would be expected that the population with e-commerce and eco-literacy habits, aware of the sustainable product, would be willing to pay more when controlling for income effects. However, as it was not possible, because of the lack of representative results, we induce that people who have decent e-commerce habits and strong environmental knowledge will be able to make their decision more consciously about their WTP. On the other hand, the target group with bad e-commerce habits and poor environmental knowledge responded with less awareness of their willingness to pay.

Concerning the general results of WTP measurement through contingent valuation, about the PT survey, it was found that most respondents (47%) are willing to pay between 20€ and 25€ for the sustainable product (an increase of 25%), and 71% of respondents are willing to pay between 5€ and 10€ for the service example, with an average value corresponding to a price of 7€, which corresponds to an increase of about 40%. Regarding the English survey, most respondents evaluated (30%) stated that they would be willing to pay between 20€ and 25€ for the product (an increase of 25%), and 23% of respondents (the majority) said that they would be willing to pay 7€ for the service, which corresponds to an increase of about 40%.

Regarding the Price Sensitivity Meter, the method allowed the realization of an optimal price corresponding to the highest profit margin, for the example of the product. Thus, in the questionnaire in Portuguese, it was concluded that the optimal price for the product is 25€, corresponding to a profit of 18.26€. For the questionnaire in English, the optimal price is 35€, corresponding to a maximum profit of 19.29€. Furthermore, the PSM was used to identify two price thresholds, the optimal price point and the point of marginal expensiveness. As for the first point, the graphic shows agreement with the tabulation performed for the same method and the contingent valuation method. In other words, for the survey in PT, the intersection corresponding to the OPP is between 25€ and 30€. The PME corresponds to around 40€, after which the price of the service would no longer make customers buy it. As for the survey in EN, the OPP also corresponded between 25€ and 30€, with a slightly higher PME, around 43€.

This reveals the fact that in the EN survey, the population has a higher income and is more eco-literate, therefore has a different perception of what they would be willing to pay in terms of an optimal or overpriced value for the sustainable product.

It is concluded that the main questions initially raised were answered, regarding whether people are predisposed to pay more for sustainable products and services, having been verified that exists a wide margin, which was measured. Through the realization of target groups, it was possible to understand how demography, based on

the characteristics of age, gender, and income, in addition to the e-commerce and eco-literacy habits of the demographic sample, interfered with the willingness to pay.

In addition to these considerations, the questionnaires also made it possible to evaluate the respondent's assessment of MyGreenApp characteristics, with several aspects having been concluded. Regarding the percentage of green premium, in the PT survey was a greater margin of respondents willing to pay 0 to 15%, while in the questionnaire in English, there was a greater margin of respondents willing to pay between 15% to 35% green premium.

Regarding the appreciation of the idea of the carbon footprint measurement tool associated with products and services sold on the marketplace or the social network, which would integrate the stakeholders, most respondents of the PT and the EN survey, found that strongly agree or agree.

Regarding the limitations of the methodology, it should be noted that the data obtained through the survey experiments is not completely representative of the population, which limits the generalizability of the results. This happened because the dissemination of the surveys was done in an academic community and international online training, and therefore there are biases related to age, professional training, level of education, and country of origin. However, it was found that, despite this, the results of both surveys were consistent, as they resulted in similar Willingness to pay curves, mean values , and sampling mode, according to the different methods used. It was found that the execution of the direct question method of contingent valuation resulted in identical results for both population samples of the two questionnaires, while the PSM method allowed obtaining different results that distinguish the two samples.

In addition, it should be noted that the execution of target groups was carried out with few respondents. After all the restrictions made in the data set to get the study groups, the values obtained for WTP were just a few data points, which may affect the representativeness of the sample. Thus, as future work, this type of analysis should be carried out with a larger sample of respondents.

Still regarding the methodology, it is highlighted that, for this dissertation, a statistical analysis was not carried out to understand the reliability of the responses to the questionnaires, which should be done in the future. Furthermore, regarding the Likert scale, which was widely used, it is important to highlight that there are disadvantages to including a central value, which is reported in the literature. In this sense, this may condition the results obtained, and thus, in future survey projects, different scales may be applied to correct this situation.

The implications of the conclusions and results of this thesis translate into the possibility of MyGreenApp being able to conduct studies to understand what kind of

products and services have representation in the sustainable online market and later associate them with environmental impact measurements, or ecological labels, and so to understand the predisposition of people to pay more for these products, through the realization of experiences that measure stated and revealed preferences. WTP can thus be translated into a commission applied to each purchase made, and to retailers who sell their products and services on MyGreenApp sustainable Marketplace.

5.1. Future work

As future work, it is important to highlight that the experiences conducted in this dissertation concern stated preferences, rather than revealed preferences. Revealed preferences would be related to effective market studies, or to WTP methodologies that involve the consumer in the process of purchasing a product or service. As there is a difference between what people say they would pay, and what they pay, further studies should be done to get a clearer picture of the situation, studying actual behavior rather than purchase intentions.

Also, to obtain target groups among a research survey, much more responses must be gathered, so that we can work with the several variables, necessary to control, and understand how different socio-economic and demographic parameters may fit in with WTP for products and services on the Marketplace, in a representative and valid data set.

Emphasis should be placed on more measures of willingness to pay through examples of different products and services. As it was possible to see among the most recognized categories in the market regarding ethical and sustainable marketplaces, it can be applied, for example, to cosmetics and decorative or household items, concerning their sustainable and ethical characteristics.

In this thesis, contingent valuation was used to measure the willingness to pay, however, open-ended format (as it is this case) works for most willingness-to-pay surveys but is especially ideal for product/service concepts with existing substitutes, not a radically new product or service. Thus, for future reference, using a close-ended question format to measure availability to pay might be an ideal option, when the product/service features may not yet be formalized, asking respondents to choose between different options of reasonable prices for the product/service.

Also, another thing that can be done in the future is to measure the expected cost, from an open-ended format, asking respondents what they would expect to pay—not what they are willing to pay. This model is ideal for new product or service concepts

once it gauges consumers' expectations for how much something new might cost. This range will guide the company's thinking and research about the optimal price to charge.

Unlike other established pricing techniques, PSM provides a continuous assessment of price sensitivity across a very wide range of prices, which then can be transformed into a range of acceptable prices that sets boundaries that are useful for crafting pricing strategies and tactics, and for price positioning. This way, in future work, all four questions should be made, in opposition to the purpose of this thesis from which only three of them were completed.

Also, in further studies, the target audience for the application of the survey should be market acquainted. This is because, as the PSM also deals with stated preferences, there is no prompting or competitive set, and answers are based on respondents' perceptions of competitive offerings and prices, assuming respondents know the market. This was why it was tried to evaluate the e-commerce habits and eco-literacy. However, using specific software to disseminate studies across target audiences will be more preeminent.

Moreover, since PSM lacks any assessment of sales, for making pricing decisions, it should be combined with a direct approach to pricing research (which explains why the CV method was used). The Van Westendorp Price Sensitivity Meter gives a first impression of how much consumers are willing to pay and price sensitivity should be carried out in parallel with other price determination methods.

Regarding demographics evaluation in market surveys, assessing different countries and cities WTP might be fundamental to find markets to start with. In the present thesis, no relevance was given to such analysis, although annex 3 represents the average WTP values for the product and service according to different countries. However, a relationship of WTP with the geography of the respondents stands out as future work, to related markets, countries, and cities, where there is greater willingness to pay for sustainable products and services.

References

[1] “The Difference Between Industrial vs. Consumer Goods.” https://www.investopedia.com/ask/answers/050415/how-are-industrial-goods-different-consumer-goods.asp (accessed Oct. 02, 2021).

[2] “Consumer Goods Sector Definition.” https://www.investopedia.com/terms/c/consumer-goods-sector.asp (accessed Oct. 03, 2021).

[3] M. Hänninen, L. Mitronen, and S. K. Kwan, “Multi-sided marketplaces and the transformation of retail: A service systems perspective,” *J. Retail. Consum. Serv.*, vol. 49, no. April, pp. 380–388, 2019, doi: 10.1016/j.jretconser.2019.04.015.

[4] “Electronic Commerce (Ecommerce) Definition.” https://www.investopedia.com/terms/e/ecommerce.asp (accessed Oct. 03, 2021).

[5] “Types of e-commerce | Bloomidea.” https://bloomidea.com/en/blog/types-e-commerce (accessed Oct. 03, 2021).

[6] “e commerce advantages and disadvantages.” https://blog.apruve.com/e-commerce-advantages-and-disadvantages (accessed Oct. 03, 2021).

[7] T. M. Nisar and G. Prabhakar, “What factors determine e-satisfaction and consumer spending in e-commerce retailing?,” *J. Retail. Consum. Serv.*, vol. 39, pp. 135–144, Nov. 2017, doi: 10.1016/J.JRETCONSER.2017.07.010.

[8] K. C. Laudon *et al.*, “E-Commerce 2016: Business, Technology and Society,” Accessed: Oct. 03, 2021. [Online]. Available: www.pearsonglobaleditions.com.

[9] M. Singh, “E□services and their role in B2C e□commerce,” *Manag. Serv. Qual. An Int. J.*, vol. 12, no. 6, pp. 434–446, Dec. 2002, doi: 10.1108/09604520210451911.

[10] “E-commerce worldwide - statistics & facts | Statista.” https://www.statista.com/topics/871/online-shopping/#dossier-chapter1 (accessed Oct. 03, 2021).

[11] “» US Ecommerce Forecast Revised Upward, 18% Growth Expected in 2021 eMarketer Newsroom.” https://www.emarketer.com/newsroom/index.php/us-ecommerce-forecast-revised-upward-18-growth-expected-in-2021/ (accessed Oct. 03, 2021).

[12] “• Internet company vertical revenue growth 2021 | Statista.” https://www.statista.com/statistics/271579/internet-company-vertical-revenue-growth/ (accessed Oct. 03, 2021).

[13] “Sector Update Marketplaces Marketplaces perspectives,” pp. 1–46, 2020.

[14] “The Role of Mobile Devices in eCommerce.” https://www.aarki.com/blog/the-role-of-mobile-devices-in-ecommerce (accessed Oct. 03, 2021).

[15] “• Global retail site device visit & order share 2021 | Statista.” https://www.statista.com/statistics/568684/e-commerce-website-visit-and-orders-by-device/ (accessed Oct. 03, 2021).

[16] “Global e-commerce jumps to $26.7 trillion, fuelled by COVID-19 | | UN News.” https://news.un.org/en/story/2021/05/1091182 (accessed Oct. 03, 2021).

[17] “• E-commerce shares worldwide before and after the pandemic 2021 | Statista.” https://www.statista.com/statistics/1228660/e-commerce-shares-development-during-pandemic/ (accessed Oct. 03, 2021).

[18] “COVID-19 pandemic accelerated shift to e-commerce by 5 years, new report says | TechCrunch.” https://techcrunch.com/2020/08/24/covid-19-pandemic-accelerated-shift-to-e-commerce-by-5-years-new-report-says/?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_sig=AQAAABYpEpeflYwjZ3DhInu1zRwOzhD9nsIFiSO-OPc0hVff1lC311ok9N5ro8n7hWoQzo01kRTwo_adNonC9KZJjmBr9O6reAvLurdycS6RBtcav9Wb_2J9GSXyyMzW4d8qKFBuWxydDOMA3cjDRGZsbEL9JcZJnCQk3wgqdbvpqaEL (accessed Oct. 03, 2021).

[19] F. Arnold, I. Cardenas, K. Sörensen, and W. Dewulf, “Simulation of B2C e-commerce distribution in Antwerp using cargo bikes and delivery points,” *Eur. Transp. Res. Rev. 2017 101*, vol. 10, no. 1, pp. 1–13, Dec. 2017, doi: 10.1007/S12544-017-0272-6.

[20] “Why marketplaces keep growing | Productsup.” https://www.productsup.com/blog/marketplace-growth/ (accessed Oct. 03, 2021).

[21] “Marketplace: o que é, qual a importância e como operar?” https://rockcontent.com/br/blog/marketplace/ (accessed Aug. 19, 2021).

[22] “What is an online marketplace? | E-commerce terms.” https://www.sana-commerce.com/e-commerce-terms/what-is-an-online-marketplace/ (accessed Oct. 03, 2021).

[23] C. Bratt, “Assessment of eco-lAbelling And green Procurement from A strAtegic sustAinAbility PersPective.”

[24] “Achieving Sustainable Development and Promoting Development Cooperation Dialogues at the Economic and Social Council Achieving Sustainable Development and Promoting Development Cooperation,” 2008.

[25] J. Elkington, “Cannibals with forks: The triple bottom line of sustainability,” *New Soc. Publ.*, pp. 37–51, 1998, Accessed: Oct. 03, 2021. [Online]. Available: https://books.google.com/books/about/Cannibals_with_Forks.html?hl=de&id=dIJ

AbIM7XNcC.

[26] “The three pillars of sustainability.” https://www.futurelearn.com/info/courses/sustainability-society-and-you/0/steps/4618 (accessed Oct. 03, 2021).

[27] “An estimated 12.6 million deaths each year are attributable to unhealthy environments.” https://www.who.int/news/item/15-03-2016-an-estimated-12-6-million-deaths-each-year-are-attributable-to-unhealthy-environments (accessed Oct. 03, 2021).

[28] “Sustainability in Ecommerce + Steps for Becoming Eco-Friendly (2021).” https://www.bigcommerce.com/blog/ecommerce-sustainability/#what-is-sustainability-exactly (accessed Oct. 03, 2021).

[29] A. Berglund and M. Svanteson, “Sustainable E-commerce How to integrate the dimensions of sustainability within the e-commerce sector,” pp. 1–46, 2018, [Online]. Available: http://www.diva-portal.org/smash/get/diva2:1215642/FULLTEXT01.pdf.

[30] P. Bansal, “The corporate challenges of sustainable development,” *https://doi.org/10.5465/ame.2002.7173572*, vol. 16, no. 2, pp. 122–131, May 2002, doi: 10.5465/AME.2002.7173572.

[31] “Global Consumers Seek Companies That Care About Environmental Issues – Nielsen.” https://www.nielsen.com/eu/en/insights/article/2018/global-consumers-seek-companies-that-care-about-environmental-issues/ (accessed Oct. 03, 2021).

[32] “Climate explained: are consumers willing to pay more for climate-friendly products?” https://theconversation.com/climate-explained-are-consumers-willing-to-pay-more-for-climate-friendly-products-146757 (accessed Jul. 09, 2021).

[33] K. Kianpour, A. Jusoh, and M. Asghari, “Environmentally friendly as a new dimension of product quality,” *Int. J. Qual. Reliab. Manag.*, vol. 31, no. 5, 2014.

[34] Capgemini Research Institute, “Consumer Products and Retail: How sustainability is fundamentally changing consumer preferences,” pp. 1–48, 2020.

[35] “Consumidores mudam preferências em função de critérios de sustentabilidade | Computerworld.” https://www.computerworld.com.pt/2020/07/21/consumidores-mudam-preferencias-em-funcao-de-criterios-de-sustentabilidade/ (accessed Oct. 03, 2021).

[36] M. Peterson, E. A. Minton, R. L. Liu, and D. E. Bartholomew, “Sustainable Marketing and Consumer Support for Sustainable Businsses,” *Sustain. Prod. Consum.*, vol. 27, pp. 157–168, 2021, doi: 10.1016/j.spc.2020.10.018.

[37] “Consumidores preferem marcas sustentáveis | Notícias | IMR – Instituto de

Marketing Research." https://www.imr.pt/pt/noticias/consumidores-preferem-marcas-sustentaveis (accessed Oct. 03, 2021).

[38] "What is a circular economy? | Ellen MacArthur Foundation." https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview (accessed Oct. 04, 2021).

[39] "Amazon Co-founds The Climate Pledge, Setting Goal to Meet the Paris Agreement 10 Years Early | Amazon.com, Inc. - Press Room." https://press.aboutamazon.com/news-releases/news-release-details/amazon-co-founds-climate-pledge-setting-goal-meet-paris/ (accessed Oct. 03, 2021).

[40] "Bezos Puts $1 Billion of $10 Billion Climate Pledge Into Conservation - The New York Times." https://www.nytimes.com/2021/09/20/business/jeff-bezos-earth-fund.html (accessed Oct. 03, 2021).

[41] "Zara clothes to be made from 100% sustainable fabrics by 2025 | Fashion | The Guardian." https://www.theguardian.com/fashion/2019/jul/17/zara-collections-to-be-made-from-100-sustainable-fabrics (accessed Oct. 03, 2021).

[42] "Queremos mercados éticos? | Opinião | PÚBLICO." https://www.publico.pt/2018/11/12/economia/opiniao/queremos-mercados-eticos-1850345 (accessed Oct. 03, 2021).

[43] R. Vaibhav, V. Bhalerao, and A. Deshmukh, "Green Marketing: Greening the 4 Ps of Marketing," *Int. J. Knowl. Res. Manag. E-Commerce*, vol. 5, pp. 5–8, Apr. 2015.

[44] "Sustentabilidade é a nova tendência no Mercado Livre." https://www.ideris.com.br/blog/sustentabilidade-e-a-nova-tendencia-no-mercado-livre/ (accessed Oct. 03, 2021).

[45] "Market Research Definition." https://www.investopedia.com/terms/m/market-research.asp (accessed Oct. 03, 2021).

[46] "The Best Online Marketplaces for Selling Your Products (2021)." https://www.bigcommerce.com/blog/online-marketplaces/#what-is-an-online-marketplace (accessed Oct. 03, 2021).

[47] "E-Commerce Players Are Competing Against Amazon," 2021.

[48] "6 Trends Rising E-Commerce Players Are Leveraging To Compete Against Amazon - CB Insights Research." https://www.cbinsights.com/research/report/e-commerce-trends-amazon-competitors/ (accessed Oct. 03, 2021).

[49] "The World's Top Online Marketplaces 2021." https://www.webretailer.com/b/online-marketplaces/ (accessed Oct. 03, 2021).

[50] "Single Market for Green Products - Environment - European Commission." https://ec.europa.eu/environment/eussd/smgp/facts_and_figures_en.htm (accessed Oct. 03, 2021).

[51] “Seven Must-Shop Ethical Marketplaces | by B The Change | B The Change.” https://bthechange.com/seven-must-shop-ethical-marketplaces-21834b7e3b5e (accessed Oct. 03, 2021).

[52] “How to navigate fair trade labels and greenwashing.” https://www.soapboxproject.org/journal/what-is-fair-trade-and-how-do-the-labels-work-vs-greenwashing (accessed Oct. 03, 2021).

[53] “10 Sustainable & Fair Trade Online Stores for Conscious Shopping.” https://www.consciouslifeandstyle.com/online-ethical-marketplaces/ (accessed Oct. 03, 2021).

[54] “Que informações é que uma empresa cotada em bolsa está obrigada a publicar? - Direitos e Deveres dos Cidadãos.” https://www.direitosedeveres.pt/q/economia-negocios-e-consumidores/empresas/que-informacoes-e-que-uma-empresa-cotada-em-bolsa-esta-obrigada-a-publicar (accessed Oct. 03, 2021).

[55] “Explainer: what exactly must companies disclose to investors?” https://theconversation.com/explainer-what-exactly-must-companies-disclose-to-investors-82979 (accessed Oct. 03, 2021).

[56] “Benefits of the Stock Exchange.” https://finance.zacks.com/benefits-stock-exchange-6013.html (accessed Oct. 03, 2021).

[57] “Getting to Know the Stock Exchanges.” https://www.investopedia.com/articles/basics/04/092404.asp (accessed Oct. 03, 2021).

[58] “About Package Free.” https://packagefreeshop.com/pages/about (accessed Oct. 03, 2021).

[59] “Browse our online store | Better World Books.” https://www.betterworldbooks.com/ (accessed Oct. 03, 2021).

[60] “Thrive Market | Healthy living made easy.” https://thrivemarket.com/ (accessed Oct. 03, 2021).

[61] “About Us – Accompany.” https://www.accompanyus.com/pages/our-mission (accessed Oct. 03, 2021).

[62] “thredUP | An Online Consignment & Thrift Store.” https://www.thredup.com/ (accessed Oct. 03, 2021).

[63] “Quais são os 5 maiores marketplaces em Portugal?” https://www.jasminsoftware.pt/blog/5-marketplaces-em-portugal/ (accessed Oct. 03, 2021).

[64] “Conheça as marcas portuguesas ecologicamente correctas.” https://www.e-konomista.pt/marcas-ecologicamente-correctas-portugal/ (accessed Oct. 03, 2021).

[65] “Fair Bazaar.” https://thefairbazaar.com/ (accessed Oct. 03, 2021).

[66] “Juntos contra o desperdício alimentar | Too Good To Go.” https://toogoodtogo.pt/pt (accessed Oct. 03, 2021).

[67] “Why Companies Are Becoming B Corps and Green Certified - GBB.” https://greenbusinessbureau.com/blog/why-companies-are-becoming-b-corps-and-certified-green-businesses/?gclid=Cj0KCQjw7MGJBhD-ARIsAMZ0eevAhvV1sVM1BbyAgs6KrXR0dzGsawcQd5bmZzcPFm07LHOvodyY7PUaAoQqEALw_wcB (accessed Oct. 03, 2021).

[68] “Qual a diferença entre produtos e serviços? | ContaAzul Blog.” https://blog.contaazul.com/diferenca-entre-produto-e-servico (accessed Oct. 03, 2021).

[69] “Online purchases, EU-27(1), 2020 (% of individuals who bought or ordered goods or services over the internet for private use in the previous 3 months).png - Statistics Explained.” https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Online_purchases,_EU-27(1),_2020_(%25_of_individuals_who_bought_or_ordered_goods_or_services_over_the_internet_for_private_use_in_the_previous_3_months).png&oldid=512818#filehistory (accessed Oct. 03, 2021).

[70] “• Online purchases by category in the United States 2021 | Statista.” https://www.statista.com/forecasts/997093/online-purchases-by-category-in-the-us (accessed Oct. 03, 2021).

[71] “Initiative on substantiating green claims - Environment - European Commission.” https://ec.europa.eu/environment/eussd/smgp/initiative_on_green_claims.htm (accessed Oct. 03, 2021).

[72] by Simon Bolwig, “GLOBAL FORUM ON TRADE TRADE AND CLIMATE CHANGE.”

[73] “CONSUMER MARKET STUDY ON ENVIRONMENTAL CLAIMS FOR NON-FOOD PRODUCTS.”

[74] “Greenhouse Gas Protocol |.” https://ghgprotocol.org/ (accessed Oct. 03, 2021).

[75] “Report: Financing the European Green Deal.” https://www.positivemoney.eu/2019/09/european-green-deal/?gclid=CjwKCAjwgOGCBhAlEiwA7FUXkjeI_aekxdX1nINffzr2IKyp_o95Wpjj4p795WDQp6iSxDFp89H7rRoC6EQQAvD_BwE (accessed Oct. 03, 2021).

[76] “Game-changer: Financing the European Green Deal Issue Date,” 2019.

[77] “Can Your Brand Profit From a Sustainable Circular Business Model? - Insider Intelligence Trends, Forecasts & Statistics.” https://www.emarketer.com/content/can-a-circular-business-model-be-a-

profitable-and-sustainable-approach-for-your-brand (accessed Oct. 03, 2021).

[78] “About the Fashion Industry Charter for Climate Action | UNFCCC.” https://unfccc.int/climate-action/sectoral-engagement/global-climate-action-in-fashion/about-the-fashion-industry-charter-for-climate-action (accessed Oct. 03, 2021).

[79] “Why Is Fast Fashion Thriving in the Era of Sustainable Shoppers? - Insider Intelligence Trends, Forecasts & Statistics.” https://www.emarketer.com/content/why-is-fast-fashion-thriving-in-the-era-of-sustainable-shoppers (accessed Oct. 04, 2021).

[80] “This Online Marketplace Is Dedicated To Selling Ethical Clothes.” https://www.forbes.com/sites/lucysherriff/2019/08/19/this-online-marketplace-is-dedicated-to-selling-ethical-clothes/?sh=2e0eb3ca5c29 (accessed Oct. 04, 2021).

[81] “E-Commerce Grows in the Fashion Industry - Marketing Charts.” https://www.marketingcharts.com/industries/retail-and-e-commerce-106623 (accessed Oct. 04, 2021).

[82] “Trendy, cheap, and dirty: Fashion is a top global polluter.” https://news.mongabay.com/2020/04/trendy-cheap-and-dirty-fashion-is-a-top-global-polluter/ (accessed Oct. 04, 2021).

[83] “What Happens When Fashion Becomes Fast, Disposable And Cheap? : NPR.” https://www.npr.org/2016/04/08/473513620/what-happens-when-fashion-becomes-fast-disposable-and-cheap?t=1633304688521 (accessed Oct. 04, 2021).

[84] “The Impact of Fast Fashion.” https://www.codogirl.com/blogs/news/the-impact-of-fast-fashion (accessed Oct. 04, 2021).

[85] “What is mobility and environment all about? | BMU.” https://www.bmu.de/en/topics/air-noise-mobility/mobility/what-is-mobility-and-environment-all-about (accessed Oct. 04, 2021).

[86] “Sources of Greenhouse Gas Emissions | US EPA.” https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions (accessed Oct. 04, 2021).

[87] “The contribution of transport to GHG emissions | EU Transport GHG: Routes to 2050.” https://www.eutransportghg2050.eu/cms/the-contribution-of-transport-to-ghg-emissions/ (accessed Oct. 04, 2021).

[88] “CO2 emissions from cars: facts and figures (infographics) | News | European Parliament.” https://www.europarl.europa.eu/news/en/headlines/society/20190313STO31218/

co2-emissions-from-cars-facts-and-figures-infographics (accessed Oct. 04, 2021).

[89] “Eco Design: What it is, Advantages and Examples - Iberdrola.” https://www.iberdrola.com/social-commitment/eco-design-sustainable-products (accessed Oct. 04, 2021).

[90] “Plastic Kills. It’s Time To Take Some Action! - Greenpeace India.” https://www.greenpeace.org/india/en/story/11340/plastic-kills-its-time-to-take-some-action/ (accessed Oct. 04, 2021).

[91] K. Zeiler and J. Teitelbaum, “Research Handbook on Behavioral Law and Economics,” *Books*, Mar. 2018, Accessed: Oct. 04, 2021. [Online]. Available: https://scholarship.law.bu.edu/books/35.

[92] K. M. Miller, R. Hofstetter, H. Krohmer, and Z. J. Zhang, “How Should Consumers’ Willingness to Pay be Measured? An Empirical Comparison of State-of-the-Art Approaches,” *J. Mark. Res.*, vol. 48, no. 1, pp. 172–184, Feb. 2011, doi: 10.1509/jmkr.48.1.172.

[93] “Willingness to Pay: What It Is & How to Calculate.” https://online.hbs.edu/blog/post/willingness-to-pay (accessed Oct. 04, 2021).

[94] “Measuring willingness to pay in experimental economics – Healthcare Economist.” https://www.healthcare-economist.com/2020/03/23/measuring-willingness-to-pay-in-experimental-economics/ (accessed Jul. 09, 2021).

[95] J. Anderson, D. Jam, and P. Chintagunta, “Customer Value Assessment in Business Markets: A State-of-Practice Study,” Jan. 1993.

[96] C. Breidert, M. Hahsler, and T. Reutterer, “A Review of Methods for Measuring Willingness-to-Pay,” *Innov. Mark.*, vol. 1, Feb. 2015.

[97] K. G. Grunert *et al.*, “Comparing methods for measuring consumer willingness to pay for a basic and an improved ready made soup product,” *Food Qual. Prefer.*, vol. 20, no. 8, pp. 607–619, 2009, doi: 10.1016/j.foodqual.2009.07.006.

[98] “Applications of the contingent valuation method in developing countries.” http://www.fao.org/3/x8955e/x8955e03.htm (accessed Oct. 04, 2021).

[99] W. J. Umberger and D. M. Feuz, “The Usefulness of Experimental Auctions in Determining Consumers’ Willingness-to-Pay for Quality-Differentiated Products,” *Rev. Agric. Econ.*, vol. 26, no. 2, pp. 170–185, Oct. 2004, [Online]. Available: http://www.jstor.org/stable/3700829.

[100] A. Gustafsson, A. Herrmann, and F. Huber, “Conjoint Measurement : Methods and Applications,” p. 568, 2003.

[101] A. Biswas, “A Study of Consumers’ Willingness to Pay for Green Products,” *©2016 Eng. Technol. Publ. J. Adv. Manag. Sci.*, vol. 4, no. 3, 2016, doi:

10.12720/joams.4.3.211-215.

[102] S. Wei, T. Ang, and V. E. Jancenelle, “Willingness to pay more for green products: The interplay of consumer characteristics and customer participation,” *J. Retail. Consum. Serv.*, vol. 45, no. June, pp. 230–238, 2018, doi: 10.1016/j.jretconser.2018.08.015.

[103] R. Elzinga, D. Reike, S. O. Negro, and W. P. C. Boon, “Consumer acceptance of circular business models,” *J. Clean. Prod.*, vol. 254, p. 119988, 2020, doi: 10.1016/j.jclepro.2020.119988.

[104] R. H. W. Boyer, A. D. Hunka, M. Linder, K. A. Whalen, and S. Habibi, “Product Labels for the Circular Economy: Are Customers Willing to Pay for Circular?,” *Sustain. Prod. Consum.*, vol. 27, pp. 61–71, 2021, doi: 10.1016/j.spc.2020.10.010.

[105] K. Higgins, W. G. Hutchinson, and A. Longo, “Willingness-to-Pay for Eco-Labelled Forest Products in Northern Ireland: An Experimental Auction Approach,” *J. Behav. Exp. Econ.* , vol. 87, no. May, p. 101572, 2020, doi: 10.1016/j.socec.2020.101572.

[106] T. Shahsavar, V. Kubeš, and D. Baran, “Willingness to pay for eco-friendly furniture based on demographic factors,” *J. Clean. Prod.*, vol. 250, 2020, doi: 10.1016/j.jclepro.2019.119466.

[107] K. H. Kang, L. Stein, C. Y. Heo, and S. Lee, “Consumers’ willingness to pay for green initiatives of the hotel industry,” *Int. J. Hosp. Manag.*, vol. 31, no. 2, pp. 564–572, Jun. 2012, doi: 10.1016/j.ijhm.2011.08.001.

[108] “How much more would you pay for a sustainable T-shirt? | Vogue Business.” https://www.voguebusiness.com/sustainability/how-much-more-would-you-pay-for-a-sustainable-t-shirt (accessed Oct. 27, 2021).

[109] “Introducing the Green Premiums | Bill Gates.” https://www.gatesnotes.com/Energy/Introducing-the-Green-Premiums (accessed Oct. 04, 2021).

[110] “The Green Premium.” https://www.breakthroughenergy.org/our-challenge/the-green-premium (accessed Oct. 04, 2021).

[111] T. H. L. S. F. on C. Governance, “Carbon Premium around the World,” *https://corpgov.law.harvard.edu/*, May 2020, Accessed: Oct. 04, 2021. [Online]. Available: https://corpgov.law.harvard.edu/2020/05/11/carbon-premium-around-the-world/.

[112] D. Kloss and M. Kunter, “THE VAN WESTENDORP PRICE-SENSITIVITY METER AS A DIRECT MEASURE OF WILLINGNESS-TO-PAY,” *Eur. J. Manag.*, vol. 16, no. 2, pp. 45–54, Jun. 2016, doi: 10.18374/EJM-16-2.4.

[113] “Medidor Van Westendorp para determinar o preço ideal | QuestionPro.”

https://www.questionpro.com/blog/pt-br/medidor-van-westendorp/ (accessed Oct. 04, 2021).

[114] “How to Do a Pricing Analysis: Van Westendorp Price Sensitivity Meter.” https://www.appinio.com/en/pricing-analysis-van-westendorp (accessed Oct. 04, 2021).

[115] “Van Westendorp Price Sensitivity Meter | MM Marketing Mind, Research Analytics.” http://www.marketinganalytics-destiny.com/Marketing-Analytics/~pr-van-westengorp-psm.php (accessed Oct. 04, 2021).

[116] “Importance of research approach in a research.” https://www.projectguru.in/selecting-research-approach-business-studies/ (accessed Oct. 04, 2021).

[117] “Difference between qualitative and quantitative research.” https://www.snapsurveys.com/blog/qualitative-vs-quantitative-research/ (accessed Oct. 04, 2021).

[118] M. Saunders, P. Lewis, A. Thornhill, and A. Bristow, “‘Research Methods for Business Students’ Chapter 4: Understanding research philosophy and approaches to theory development,” 2019, pp. 128–171.

[119] S. Wright, B. C. O’Brien, L. Nimmon, M. Law, and M. Mylopoulos, “Research Design Considerations,” *J. Grad. Med. Educ.*, vol. 8, no. 1, pp. 97–98, Feb. 2016, doi: 10.4300/JGME-D-15-00566.1.

[120] “How to formulate a research strategy?” https://www.projectguru.in/how-to-formulate-a-research-strategy/ (accessed Oct. 04, 2021).

[121] P. Johannesson and E. Perjons, “Research Strategies and Methods,” *An Introd. to Des. Sci.*, pp. 39–73, 2014, doi: 10.1007/978-3-319-10632-8_3.

[122] “7 Steps to a Successful Target Audience Analysis.” https://www.appinio.com/en/target-audience-analysis (accessed Oct. 04, 2021).

[123] “Market Segmentation: Everything to Know in 2020 // Qualtrics.” https://www.qualtrics.com/experience-management/brand/what-is-market-segmentation/ (accessed Oct. 04, 2021).

[124] “Survey Response Scales: How to Choose the Right One | CXL.” https://cxl.com/blog/survey-response-scales/ (accessed Oct. 04, 2021).

[125] “Demographic Survey Questions to Reel in Your Target Market - Pollfish Resources.” https://resources.pollfish.com/market-research/demographic-survey-questions-to-reel-in-your-target-market/ (accessed Oct. 04, 2021).

[126] “Age Groups for Surveys - SmartSurvey.” https://www.smartsurvey.co.uk/survey-questions/demographics/age-groups (accessed Oct. 04, 2021).

[127] “5 Examples of Survey Demographic Questions.”

https://www.snapsurveys.com/blog/5-survey-demographic-question-examples/ (accessed Oct. 04, 2021).

[128] “The 14 Best Demographic Questions to Use in Surveys.” https://blog.hubspot.com/service/survey-demographic-questions (accessed Oct. 04, 2021).

[129] “OECD Better Life Index.” https://www.oecdbetterlifeindex.org/pt/quesitos/income-pt/ (accessed Oct. 04, 2021).

[130] S. Panzeri, C. Magri, and L. Carraro, “Sampling bias,” *Scholarpedia*, vol. 3, no. 9, p. 4258, 2008, doi: 10.4249/SCHOLARPEDIA.4258.

[131] “What is Eco-Literacy | IGI Global.” https://www.igi-global.com/dictionary/exploring-different-forms-of-engaging-different-publics-with-environmental-sustainability/93737 (accessed Oct. 04, 2021).

[132] F. Capra, “The web of life : a new scientific understanding of living systems,” p. 347, 1996.

[133] “Environmental education and eco-literacy as tools of education for sustainable development « Journal of Sustainability Education.” http://www.susted.com/wordpress/content/environmental-education-and-eco-literacy-as-tools-of-education-for-sustainable-development_2013_02/ (accessed Oct. 04, 2021).

[134] “What You Need To Know About Fashion/Apparel Supply Chain Management.” https://www.purolatorinternational.com/what-to-know-about-fashion-apparel-supply-chain-management/ (accessed Oct. 04, 2021).

[135] “It Takes 2,700 Liters of Water to Make a T-Shirt.” https://www.triplepundit.com/story/2013/it-takes-2700-liters-water-make-t-shirt/54321 (accessed Oct. 04, 2021).

[136] “The Impact of a Cotton T-Shirt | Stories | WWF.” https://www.worldwildlife.org/stories/the-impact-of-a-cotton-t-shirt (accessed Oct. 04, 2021).

[137] “Você sabe qual é o impacto ambiental que uma camiseta causa? – Insecta Shoes.” https://insectashoes.com/blogs/blog/voce-sabe-qual-e-o-impacto-ambiental-que-uma-camiseta-causa (accessed Oct. 04, 2021).

[138] “Can fashion ever be sustainable? - BBC Future.” https://www.bbc.com/future/article/20200310-sustainable-fashion-how-to-buy-clothes-good-for-the-climate (accessed Oct. 04, 2021).

[139] “Quais os impactos ambientais de uma camiseta de algodão? - eCycle.” https://www.ecycle.com.br/impactos-ambientais-camiseta-de-algodao/

(accessed Oct. 04, 2021).

[140] “Greenhouse Gas Emissions | Relatório do Estado do Ambiente.” https://rea.apambiente.pt/content/greenhouse-gas-emissions?language=en (accessed Oct. 04, 2021).

[141] “Greenhouse gas reporting: conversion factors 2020 - GOV.UK.” https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020 (accessed Oct. 04, 2021).

[142] “Plastic Waste and Pollution [Everything You Need To Know In 2020].” https://cleanstreets.westminster.gov.uk/plastic-waste-complete-guide/ (accessed Oct. 04, 2021).

[143] “Você sabe quais plásticos não são recicláveis? | Beegreen.” https://beegreen.eco.br/plasticos-nao-reciclaveis/ (accessed Oct. 04, 2021).

[144] “Embalagens sustentáveis: o que você precisa saber - eCycle.” https://www.ecycle.com.br/embalagens-sustentaveis/ (accessed Oct. 04, 2021).

[145] “Escala Likert: saiba o que é e como usar | QuestionPro.” https://www.questionpro.com/blog/pt-br/o-que-e-escala-likert/ (accessed Oct. 05, 2021).

Attachments

A1. PT Survey

Olá!

Estamos a conduzir um estudo sobre a predisposição para pagar por produtos e serviços sustentáveis, a serem vendidos num mercado online sustentável a ser desenvolvido pela *start-up* "MyGreenApp", que combina um *marketplace*, uma rede social, e uma ferramenta de medição de pegada carbónica.

Desde já, agradecemos a sua contribuição e garantimos a salvaguarda dos dados recolhidos.

Vamos começar.

Francisco Ferreira - Estudante de Mestrado Eng. Ambiente - FEUP

Parâmetros socio-demográficos

1. Género *

A Masculino

B Feminino

C Prefiro não dizer

2. Idade *

A Até 25

B 26-35

C 36-45

D 46-55

E 56-65

F Acima de 65

3. Situação profissional *

A Estudante

B Trabalhador/a Estudante

C Trabalhador por conta própria

D Trabalhador por conta de outrem

E Desempregado

F Outro

4. Nível de escolaridade *

- A Ensino Primário
- B Ensino Básico
- C Ensino Secundário
- D Licenciatura
- E Mestrado
- F Doutoramento
- G Sem qualificações formais

5. País onde reside atualmente *

6. Cidade onde mora atualmente

7. Agregado familiar *

- A 1
- B 2
- C 3
- D 4 ou mais

8. Rendimento médio familiar (anual)

- A 0 a 15 mil €
- B 15 a 30 mil €
- C 30 a 45 mil €
- D 45 a 60 mil €
- E Mais de 60 mil €

Compras online

9. Nos últimos 3 meses, quantas compras online fez? *

resposta numérica

10. Com que frequência compra produtos online? *

- A Todas as semanas
- B Duas a três vezes por mês
- C Uma vez por mês
- D Uma vez a cada 3 meses
- E Um vez a cada 6 meses
- F Nunca

11. Pensa na sustentabilidade quando está a comprar um produto ou serviço? *

- A Sempre
- B Normalmente
- C Às vezes
- D Não muito frequentemente
- E Não sei

12. Comprou algum produto ou serviço que pudesse ser considerado sustentável, em relação à sua forma usual, nos últimos 6 meses? *

- A Sim
- B Não
- C Não sei

13. Se sim, por favor descreva-o.

Ecoliteracia

14. Tem algum tipo de formação na área ambiental ou similar, como sustentabilidade ou economia circular? *

A Sim

B Não

15. Segue algum fórum, site ou página ambiental nas redes sociais? *

A Sim

B Não

16. Como se sente familiarizado com os problemas ambientais atuais, como o aquecimento global, a escassez de recursos naturais ou a destruição de habitats? *

1	2	3	4	5	6	7

(1- pouco familiarizado e 7-fortemente familiarizado)

17. Como avalia o seu conhecimento quanto a produtos ambientalmente ecológicos vendidos na internet? *

1	2	3	4	5	6	7

(1- não informado e 7- bastante informado)

Medição da predisposição para pagar - Parte 1

Estudo de exemplo de produto

Compra de uma camisola.

Considere que deseja comprar uma camisola online, que reúne as características a seu gosto, que custa **20€**.

Considere agora um novo modelo de camisola, com o mesmo tamanho, aparência e funcionalidade. Porém, esta nova versão possui certificação ambiental destacada pelo uso de **fibras recicladas**, **algodão orgânico**, **corantes naturais**, **menos água** na produção e **menor pegada de carbono**.

Nas perguntas a seguir, responda com um número inteiro (€), em referência à camisola da marca B.

18. Quanto estaria disposto a pagar por esta nova versão, que reúne estas características? *

Reflita sobre o item que está a pensar em comprar e do preço que disse que estaria disposto a pagar.

19. A que preço consideraria que este produto teria um preço tão baixo que faria com que você duvidasse da sua qualidade? *

20. A que preço consideraria este produto tão caro, de forma a que não consideraria comprá-lo? *

21. A que preço consideraria este produto uma ótima compra pelo dinheiro dado e o impacto ambiental evitado? *

Medição da predisposição para pagar - Parte 2

Estudo de exemplo de serviço

Compra de um Serviço de Entrega de Comida ao Domicílio

Considere que deseja fazer um pedido online para uma **entrega de comida** ao seu domicílio. O exemplo desse serviço envolveria uma empresa que seria responsável pelos métodos de **embalagem** e **transporte**. Uma embalagem segura, protegida e esterilizada custaria uma taxa básica de **5€**.

Considere agora outra versão deste serviço, no entanto, a nova empresa garantiria não apenas **embalagens recicladas e biodegradáveis**, mas também um **transporte neutro em carbono** (de bicicleta*). Em comparação com o serviço "normal", o novo embalamento teria um impacto de menos de metade das emissões de carbono.

***Considere que a mudança para a bicicleta não traz atrasos na entrega.**

Nas perguntas a seguir, responda com um número inteiro (€), em referência à nova versão do serviço.

22. Quanto estaria disposto a pagar por esta nova versão, que reúne estas características? *

Reflita sobre o serviço que está a pensar adquirir e o preço que disse que estaria disposto a pagar.

23. A que preço consideraria que este serviço teria um preço tão baixo que sentiria que a sua segurança/qualidade não estaria garantida? *

24. A que preço consideraria este serviço tão caro, de forma a que não consideraria comprá-lo? *

25. A que preço consideraria este serviço uma ótima compra pelo dinheiro e o impacto ambiental evitado? *

Marketplace Sustentável

26. Numa escala de 1 a 7, como estaria disposto a pagar mais por produtos e serviços sustentáveis, reunidos num Mercado Sustentável? *

1 2 3 4 5 6 7

(1 - não daria mais dinheiro e 7 - aceitaria um preço razoável pelo serviço do *marketplace*)

27. Qual a percentagem de preço que considera razoável enquanto "*taxa verde*" de um produto ou serviço sustentável a ser vendido num *marketplace*? *

A Não consideraria pagar mais por um green premium

B 0 a 15%

C 15% a 35%

D Mais de 35%

28. Consideraria útil uma ferramenta de medição da pegada carbónica para os produtos e serviços vendidos no *marketplace*, no momento da compra? *

1 2 3 4 5 6 7

(1- discordo totalmente e 7-concordo totalmente)

29. Acharia útil uma rede social que lhe permitisse obter o feedback de outros consumidores sobre os produtos e serviços vendidos no *marketplace*? *

1 2 3 4 5 6 7

(1- discordo totalmente e 7-concordo totalmente)

30. Em relação às 2 últimas perguntas, como justificaria as suas respostas?

Estamos prestes a terminar.

Se tiver alguma opinião que gostaria de compartilhar connosco sobre este inquérito, sinta-se à vontade para compartilhá-la.

Envie-nos o seu e-mail caso queira saber os resultados do inquérito.

Subscreva a Newsletter da MyGreenApp (**https://mygreenapp.org/**) no nosso website.

Pode agora submeter o seu formulário.

A2. EN Survey

Hello!

We are conducting a study on the willingness to pay more for sustainable products and services, in a sustainable marketplace, to be developed by "MyGreenApp" start-up that combines a sustainable marketplace, a social network, and a carbon footprint tracker.

In advance, we thank you for your contribution and assure to safeguard the data collected.

Let's get started.

Francisco Ferreira - MIEA Master's Student - FEUP

Demographic Questions

1. Gender *

- A Male
- B Female
- C Prefer not to say

2. Age *

- A Under or 25
- B 26-35
- C 36-45
- D 46-55
- E 56-65
- F Over or 65

3. Professional situation *

- A Student
- B Student worker
- C Self-employed
- D Employee
- E Unemployed
- F Other

4. Highest education level attained *

- A Primary School
- B Secondary
- C Technical/community college
- D High school diploma/A-levels
- E Undergraduate
- F Graduate
- G Master
- H Doctorate
- I No formal Qualifications

5. Current country of residence *

6. City where you now live

7. Family household *

- A One
- B Two
- C Three
- D Four or more

8. Household average income

- A 0 to 15 000 € per year
- B 15 000 € to 30 000 € per year
- C 30 000 € to 45 000 € per year
- D 45 000 € to 60 000 € per year
- E Over 60 000 € per year

E-commerce habits

9. In the past 3 months, how many online orders have you placed? *

*numeric answer

10. How often do you shop online products? *

- A Every week
- B Two or three times a month
- C Once a month
- D Once every three months
- E Once every six months
- F Never

11. Do you think about sustainability when you are purchasing a product or a service? *

- A All the time
- B Usually
- C Sometimes
- D Not very often
- E I don't know

12. Have you bought any product or service that could be considered sustainable, in relation to its usual form, in the last 6 months? *

- A Yes
- B No
- C I don't know

13. If yes, please describe it.

Eco-literacy

14. Do you have any kind of training in the environmental area like sustainability or circular economy? *

A Yes

B No

15. Do you follow any environmental forums, websites or pages on social media? *

A Yes

B No

16. How familiarized are you with environmental issues, such as global warming, scarcity of natural resources or habitat destruction? *

1 2 3 4 5 6 7

(1- poorly familiarized and 7-strongly familiarized)

17. How familiarized are you with environmentally friendly products sold in online marketplaces? *

1 2 3 4 5 6 7

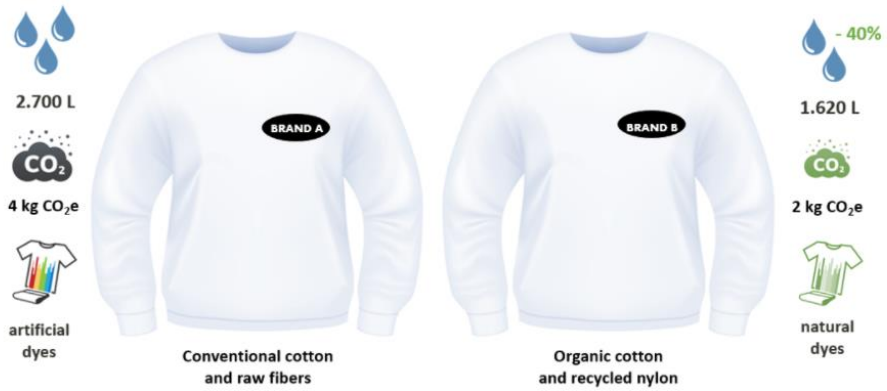
(1- not informed and 7-strongly informed)

Measuring your Willingness to Pay - Part 1

Methodology: Van Westendorp's Price Sensitivity Meter

Product example Study

Purchasing a sweater.



Consider you want to purchase a normal sweater online that costs **20 €**.

Consider now, a sweater that has the same size, looks, and functionality, however, this new eco-version has an environmental certification highlighted by the use of **recycled fibers**, **organic cotton**, **natural dyes**, **less production water,** and a **smaller carbon footprint**.

In the following questions, answer with a whole number (€), in reference to the sweater's brand B.

18. How much would you be willing to pay for this new eco-friendly version? *

Recall the item you are considering purchasing and the price you said you would be willing to pay.

19. At what price would you consider this product to be priced so low that you would doubt its quality? *

20. At what price would you consider this product to be so expensive that you would not consider buying it? *

21. At what price would you consider this product to be a bargain — a great buy for the money, and the environmental impact avoided? *

Measuring your Willingness to Pay - Part 2

Methodology: Van Westendorp's Price Sensitivity Meter

Service example Study

Purchasing a Home Food Delivery Service.

Consider that you want to place an order online for a food service home delivery. The service example would enroll a company that would be responsible for the **packaging** and **transport** methods. A motorbike transport, and safe, secure, sterilized packaging, would cost a basic fee of **5 €**.

Consider now another version of this service, however, the new company would assure not only **recycled and organic packaging** but also **carbon-neutral transport** (by bike*). In comparison with average service, the new packaging would weigh less than half of the carbon emissions.

***the changeover to the bicycle does not cause delays in delivery**

In the following questions, answer with a whole number (€), in reference to the new eco-service.

22. How much would you be willing to pay for this new version, that comprises these characteristics? *

Recall the service you are considering purchasing and the price you said you would be willing to pay.

23. At what price would you consider this service to be priced so low that you would feel its safety/quality wouldn't be assured? *

24. At what price would you consider this service to be so expensive that you would not consider buying it? *

25. At what price would you consider this service to be a bargain — a great buy for the money, and the environmental impact avoided? *

Sustainable Marketplace

26. From a scale from 1-7, how would you be willing to pay more for sustainable products and services, gathered on a Sustainable Marketplace? *

1 2 3 4 5 6 7

(Being 1-wouldn't give more money and 7-would accept a reasonable price for the marketplace service)

27. What price range do you consider reasonable for the green premium of a sustainable product or service to be sold on a Sustainable marketplace? *

A I would not consider to pay more for a green premium

B 0 to 15%

C 15% to 35%

D More than 35%

28. Would you find helpful a carbon footprint tool, for the products and services sold in a marketplace, at the time of purchase? *

1 2 3 4 5 6 7

(1- strongly disagree and 7-strongly agree)

29. Would you find helpful social media, that would allow you to get people's feedback on products and services sold in a sustainable marketplace? *

1 2 3 4 5 6 7

(1- strongly disagree and 7-strongly agree)

30. Regarding the last 2 questions, how do you justify your answers?

A3. Geographic WTP

Country	Number of answers	Average Product WTP (€)	Average Service WTP (€)
Portugal	292	25.8	7
Switzerland	11	28.6	6.9
Germany	6	32.8	5.8
Spain	5	29.2	7
UK	5	32.5	10
Brazil	3	26.7	7
USA	2	30	10
Thailand	2	24.5	7
Norway	2	25	5.5
France	2	27.5	6
Finland	2	30	7.5
Colombia	2	37.5	10
Netherlands	2	28.5	6
Austria	1	35	7.5
United Arab Emirates	1	40	10
Palestine	1	30	7
Poland	1	25	6
Sweden	1	5	8
Malaysia	1	25	5
Belgium	1	40	7
Vietnam	1	35	6
Russia	1	35	7
Egypt	1	25	6
Ukraine	1	25	7
Italy	1	30	8