The role of sustainability in the purchase intention of small kitchen appliances: the Benelux case

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Abstract

Title of the dissertation: How sustainability plays a role in the purchase intention of small kitchen appliances: the Benelux case

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Small kitchen appliances are integral parts of our households, and many businesses started to introduce kitchen appliances in the market with sustainable features. This is why more and more consumers want their households to be sustainable in terms of consumptions and they care about the materials of the appliances standing for instance. However, there are few studies on the purchase intention of sustainable small kitchen appliances. For this reason, this dissertation aims at understanding what are the main drivers, barriers, and potential user profiles when it comes to the adoption of sustainable small kitchen appliances for Benelux consumers.

After an overview on the market dynamics and a brief competitive benchmark analysis, a literature review has been conducted, then a research framework has been built. Interviews have been used to develop hypotheses as a way of answering to the research questions of this dissertation while an online questionnaire has been created to collect data to be subsequently analyzed.

The results show that brand image, energy efficient features and price considerations are key for Benelux consumers. Also, relevant considerations are done based on consumers' gender, age, and education.
Finally, some managerial implications are highlighted for small kitchen appliance companies.

Keywords: sustainability, small kitchen appliances, purchase decision making, Benelux

Resumo

Título: Como a sustentabilidade desempenha um papel na intenção de compra de pequenos eletrodomésticos de cozinha: O caso Benelux

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Os pequenos eletrodomésticos de cozinha são partes integrantes das todas as casas, e muitas empresas já começaram a introduzir no mercado eletrodomésticos de cozinha sustentáveis. Consequentemente, cada vez mais consumidores querem garantir que as suas casa aparentam um carácter sustentável e ganham preocupação com os materiais dos eletrodomésticos, por exemplo. No entanto, existem poucos estudos sobre a intenção de compra de pequenos eletrodomésticos de cozinha sustentáveis. Por essa razão, este estudo pretende perceber quais são os principais impulsionadores, barreiras e potenciais perfis de utilizadores no que se trata à adoção de pequenos eletrodomésticos de cozinha sustentáveis pelos consumidores de Benelux.

Após analisar a visão geral sobre a dinâmica do mercado e uma breve análise comparativa da concorrência, foi realizada uma revisão de literatura e consequentes perguntas para a pesquisa. Entrevistas qualitativas foram utilizadas para desenvolver hipóteses para responder às perguntas de pesquisa, enquanto um questionário online quantitativo recolheu dados que mais tarde foram analisados.

Os resultados mostram que a imagem da marca, as características de eficiência energética e as considerações de preço são fundamentais para os consumidores do Benelux. Além disso, são feitas considerações relevantes com base no género, idade e educação dos consumidores. Concluindo, são destacadas algumas implicações para gestão para as empresas de pequenos eletrodomésticos de cozinha.

Palavras-chave: sustentabilidade, pequenos eletrodomésticos de cozinha, tomada de decisão de compra, Benelux

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1 INTRODUCTION

1.1 Market dynamics

We are currently overloaded with news and content considering climate change. Sustainability is a rising trend that unites people from all walks of life.

Consumers are becoming more "ECO conscious" and that is influencing the way companies in all industries conduct business.

Consumers preference's shift to "greener" products brings interesting implications for businesses: they are willing to accept higher prices if the products are more environmentally friendly and while shopping, they always pay attention to the sustainability features of the products (e.g., environmental compatibility, longevity, no child labor and so forth).

This sustainability mega trend influences consumers at a global scale, and it is going to shape future generations of consumers even more dramatically. Overall, Gen Z and millennials show less brand loyalty when it comes to purchasing decisions. They actively look for companies that conduct business sustainably and whose goods are produced likewise. New generations are willing to switch to brands that align with their values as they are more and more aware of sustainability as a concept.

Four sustainable behaviors of Gen Z's shopping habits have been turned into meaningful data from the Green Match survey that can picture the rising meta trend:

- 72% of Gen Z is willing to spend more money on goods and services produced in a sustainable fashion;
- 25% of Gen Z often or always buy products that align with their values. Additionally, the 67% of Gen Z at least sometimes buy products that align with their values;
- 9/10 millennials are willing to switch to brands associated with a social cause and 29% of Gen Z actively seeks out brands complying with their values;
- 40% of Gen Z has stopped purchasing or boycotted a brand because they stood for something or behaved in a way that is against their values. Notably, the 49% of Gen Z are considering boycotting other brands soon.

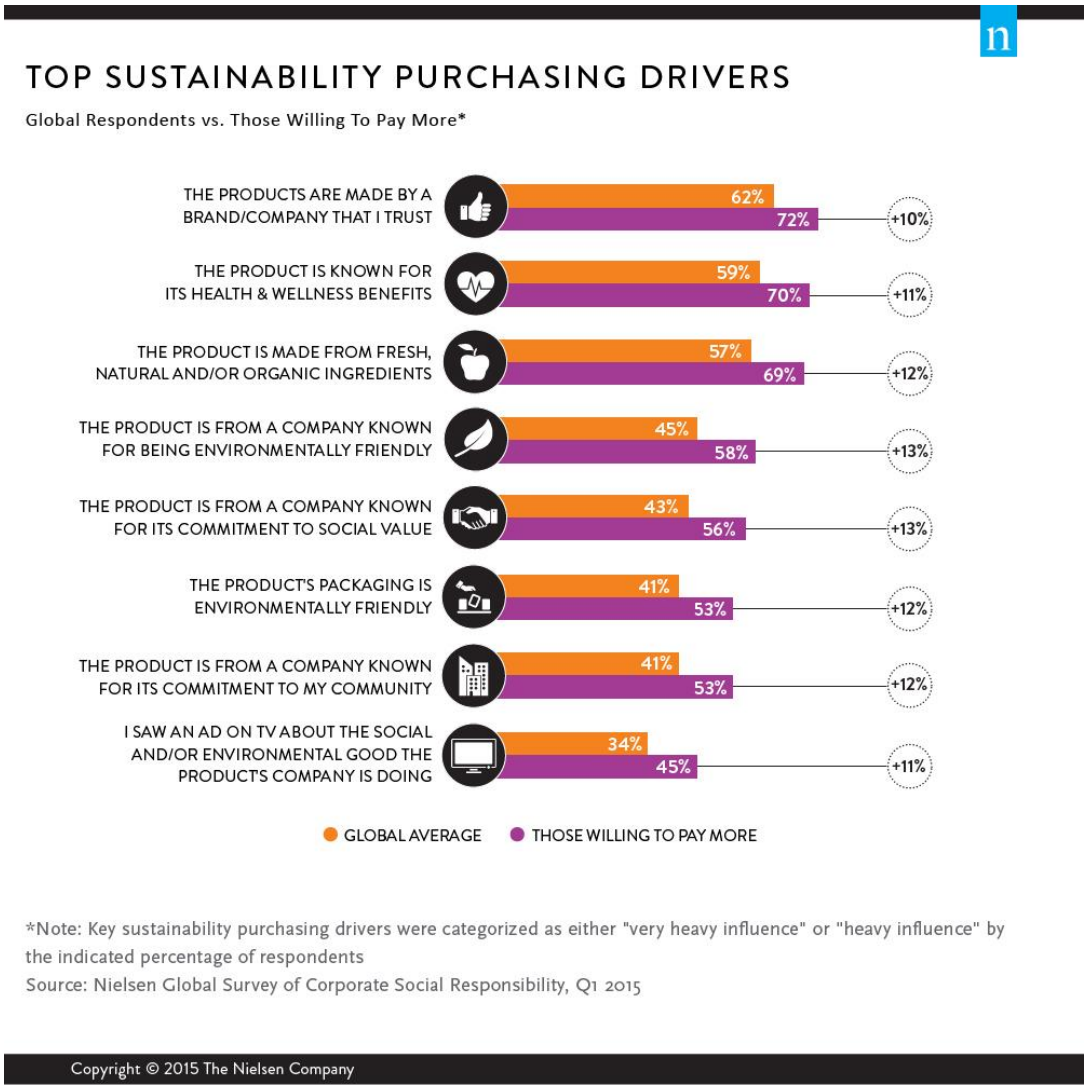


Figure 1 Top Sustainability Purchasing Drivers

As shown by the above bar chart taken from the Nielsen Global Survey of Corporate Social Responsibility, sustainability can act as a differentiator. Top sustainability purchasing drivers have been selected and the difference between the "Global Average" vs "Those Willing To Pay More" is highlighted on the right side of the graph. The differences vary from 10% to 13% and the drivers with the highest deltas are the following: "The product is from a company known for being environmentally friendly" and "The product is from a company known for its commitment to social value".

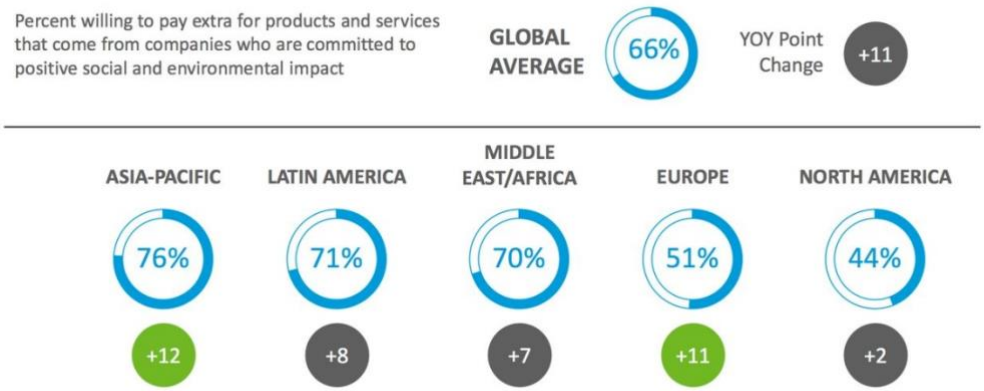


Figure 2 Willingness to pay a Premium for different geographical clusters

As displayed in the above image, the 66% of the global respondents of the Nielsen Global Survey said they are willing to pay more for products and services that come from companies that are committed to positive social and environmental impacts. If we breakdown the percentages into the different macro geographic areas, we can appreciate that the areas characterized by a greater Year-On-Year Point Change are Asia-Pacific and Europe, with the latter being the area of interest of this research, with a particular focus on the Benelux market. Moreover, when it comes to sustainability of household devices, consumers primarily think the protection of resources (energy/water/raw materials), longevity and recycling.

1.2 Industry and competitive overview

This section is going to focus on the industry and competitive overview of the sustainable small kitchen appliances, sometimes also referred as the breakfast set, namely kettle, toaster, and drip filter coffee maker. The competitive benchmark has been done taking Philips Domestic Appliances (called Versuni since February 2023) as a reference. The reason why Philips DA has been selected is given by the relevance of the company in the domestic appliance business at a global scale. On top of its representativeness, the company was founded in The Netherlands in the city of Eindhoven and its main offices are in the Dutch cities of Eindhoven, Amsterdam and Drachten.

The kitchen appliances industry is populated by quite a few players targeting consumers with different price points, different design solutions and different communication claims. What

groups together most of the competitors in the industry is the willingness to bring innovation in the households, creating better and smoother experiences in the kitchen.

The breakfast sets with unique design and communication are mostly made by metal with going Recommended Retail Price (RRP) > €100, according to the Amazon retail page of the main European markets, which are DACH (with Germany as a reference country), Benelux (with The Netherlands as the biggest contributor), France and United Kingdom.

Furthermore, even though Philips' competition continuously innovates on design, few claims sustainable materials. Competitors claim saving energy functionalities, standard for the appliances of this category, and "Earthy/Eco" style through colors and wood patterns, but not actual sustainable benefits.

There are few breakfast sets made by recycled or other sustainable materials in the market, so first a competitive benchmark between Philips small metal kitchen appliances (breakfast set products) with emphasis on design against the main competitors in the European landscape is shown below, then an overview of the latest developments from some competitors is analyzed.

By looking at the below benchmark of metal kettles, it can be quickly appreciated that all the competitors share similar product details and features. What strikes is the difference in RRPs among them and the Amazon star ratings. Philips charges way less than competitors (just 40.99 Eur), followed just by Tefal with a promo price of 42 Eur. In terms of star ratings, both Philips and Tefal have 4.2 out of 5 stars, close to the 4.3 stars DeLonghi kettle.

				
Brand	**Philips**	**DeLonghi**	**Tefal**	**Kenwood**
CTV	HD9351	KBOV 2001.AZ	KI260P40	ZJX650RD
RRP	€ 40.99	€ 73.28	€ 59.49	€ 84.99
Going price		€ 70.62	€ 42.00	€ 63.74
Capacity	1.7L	1.7L	1.7L	1L
Wattage	2200	2000	3000	2200
Lid opening	Automatic	Manual	Manual	Automatic
Filter	Yes	Yes	Yes	No
Water level indicator	Yes	Yes	Yes	Yes
Pilot light	Yes	No		Yes
Material	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Star rating	4.2(out tof 5)	4.3 (out tof 5)	4.2(out tof 5)	3.6 (out of 5)

Figure 3 Competitive Benchmark Kettles

Moving to the metal toaster competitors below, the considerations to be made are similar as the ones done for the metal kettles. Philips metal toaster is the cheapest among competition and it also offers a higher wattage (950 W) against competitors' 900 W. If we consider the Amazon rating and reviews, Philips is placed again in the second position (4.4 out of 5 stars) following closely DeLonghi with 4.5 stars.

				
Brand	**Philips**	**DeLonghi**	**Tefal**	**Kenwood**
CTV	HD2650	CTOV 2103	TF700A40	TCX751WH
RRP	€ 44.99	€ 69.99	€ 107.00	€ 89.99
Going price	€ 44.99	€ 59.90	€ 62.80	€ 73.90
Power (W)	950	900.0	900	900
Slots	2	2	4	2
Browning control	Yes	Yes	Yes	Yes
Reheat	Yes	Yes	Yes	Yes
Defrost	Yes	Yes	Yes	Yes
Mid-cycle cancel	Yes	Yes	Yes	na
Bun warmer	Yes	Yes	Yes	Yes
Material	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Variable width slots	Yes	No	Yes	No
Removable crumb tray	Yes	Yes	Yes	Yes
Star rating	4.4 (out tof 5)	4.5 (out tof 5)	4.2 (out tof 5)	4.1 (out tof 5)

Figure 4 Competitive Benchmark Toasters

Finally, when it comes to the metal drip filters, the same price considerations are again commented. Philips sells on Amazon at a way cheaper promo price in contrast with competitors, without giving up on important product details valued by consumers and by keeping a strong emphasis on design.

Ratings are remarkably high also here, with 4.4 out of 5 stars, following KitchenAid with 4.5 stars.

				
Brand	**Philips**	**DeLonghi**	**KitchenAid**	**Kenwood**
CTV	HD7546	ICMI 211	Artisan	COX750BK
RRP	€ 64.99	€ 109.99	€ 149.99	€ 99.99
Going price	€ 54.90	€ 99.59	€ 112.00	€ 90.00
Power (W)	1000	1000	1100	1000
Capacity (Cups)	8-12	10	12	6
Capacity (L)	1.2	1.25	1.7	0.75
External Water Level Indicator	Yes	Yes	Yes	Yes
Drip Stop	Yes	Yes	Yes	Yes
Removable Water Tank	No	No	No	No
Can Material	Thermal	Glass	Glass	Glass
Permanent Filter	No	Yes	No	Yes
Adjustable Coffee Strength	No	No	No	Yes
Rating	4.4 (out of 5)	3.5 (out of 5)	4.5 (out of 5)	4 (out of 5)

Figure 5 Competitive Benchmark Drip Filters

Shifting from competition on small metal breakfast sets of products, it has been noticed that some competitors put in place some strategic moves onto the same sustainable direction undertook by Philips DA when it comes to small kitchen appliances, as in the case of the French brand Moulinex-Tefal, part of the Group SEB brands. Group SEB launched in the last quarter of 2021 an Eco Design collection of sustainable small kitchen appliances including a blender, a hand blender, a shredder, and a chopper.

Even though Group SEB products compete on different sustainable small kitchen appliances than Philips, the sustainable claims and benefits are similar as the ones Philips claims for its breakfast set of small kitchen appliances. Moreover, according to internal market research (Philips small kitchen appliances competitive overview, Q4 2022) Group SEB has been taking some actions that might entail a potential entry in the sustainable sets of breakfast appliances, in that case establishing even more as Philips' main competitor. Below it has been listed some of the major differences between Group SEB Eco Design range and Philips DA Eco Conscious Edition one.

ECOdesign vs Eco Conscious Edition		
Label	**ECOdesign**	**Eco Conscious Edition**
Range	Ceramic Pan Handblender Blender Chopper Shredder Pressure cooker	Kettle Toaster Drip filter Mini blender
Principles	Materials with lower environmental impact *Focus on recycled plastic (up to 65%; percentage varies per product)* Better energy efficiency Lower impact packaging *only recycled paper* Products designed to last and be repaired (15 years guarantee) Increasingly recyclable products	Sustainable materials *Focus on biobased plastic (100%)* Energy efficiency Sustainable packaging *recycled paper and plastic wrapping bags*
Manufacturing	France	China
Markets	Europe	Europe, S. Korea
(Announced) Launch date	Sep-21	Sep-21
Communication message	Reducing our environmental impact together with eco-design	Wake up to the Philips Eco Conscious Edition
Roadmap	Additional small appliances (floor care, garment care, beauty)	Additional small domestic appliances

Figure 6 Philips DA vs Groupe SEB sustainable collections

Furthermore, it is worthwhile to mention the competition coming from "B brands" that also compete on small breakfast appliances with a clear focus on innovative design solutions and sustainable finishings. Some of these are getting more and more exposure thanks to focused marketing and communication campaigns especially in the main Amazon markets, as it is the case of the Danish brand Stelton Emma. Its sustainable breakfast set is made up of a kettle and a toaster characterized by a grey lacquered "Earthy/Eco" design style and birch wood handles whose retail prices are above the average for the category (Amazon going RRP around 120 Eur for the kettle and around 130 Eur for the toaster).

The British brand Morphy Richards has also a sustainable portfolio of small breakfast appliances which includes a kettle and a toaster. They are designed in an "Earthy/Eco" style and their patterns are wooden. Morphy Richards kettle is very price competitive in the European landscape, being ranked among top 10 best sellers both in Amazon NL and Amazon Germany, with a going RRP of around 70 Eur.

1.3 Problem statement and research questions

The objective of this research is to study and understand the perception and purchase decision making process of the Benelux consumers toward sustainable small kitchen appliances, and the latter refers to appliances such as kettles, toasters, and drip filter coffee makers. Given the rising trend undertook by both bigger and smaller kitchen appliances brands of launching sustainable sets of appliances together with an increased awareness of sustainability related to households,

consumers around the world started to switch their domestic appliances purchases toward more sustainable options. Sustainable can be seen in terms of the product materials, its energy consumption, its less complex and polluting packaging, and its appearance. Therefore, considering this Benelux target audience (including potential Belgian, Dutch and Luxembourgish consumers), this study aims at undercovering the drivers and barriers in relation to these latter appliances.

Additionally, to investigate the possible growth opportunities for companies addressing this target audience, the research considers Philips Domestic Appliances (called Versuni since February 2023), as one of the oldest, strongest and most representative players in the small kitchen appliances market. Philips DA is a worldwide recognized brand with millions of sales around the globe, which establishes as one of the main brands of small kitchen appliances in the Benelux area, also due to the fact it was born in the Netherlands in the city of Eindhoven.

Therefore, the following research questions are going to be assessed:

RQ1: What are the factors Benelux consumers value more of sustainable small kitchen appliances?

RQ2: What are the barriers for the adoption of sustainable small kitchen appliances for Benelux consumers?

RQ3: What is the user profile of sustainable small kitchen appliances?

1.4 Dissertation Structure

This dissertation is structured in 5 chapters: Introduction, Literature Review, Methodology, Results, Conclusion and Limitations.

In the *Introduction,* market dynamics, industry and competitive overview of the sustainable small kitchen appliances market and problem statement and research questions are introduced. When it comes to the *Literature Review*, an overview of sustainability in households, factors, and barriers to the adoption of sustainable small kitchen appliances, different user profiles, limitations of the existing literature and research frameworks are discussed. Then with the *Research Methodology* qualitative and quantitative research methods are presented. The fourth chapter *Results* assess indeed the results of this research while the last chapter discusses the *Conclusions and Limitations* of the present dissertation.

2 LITERATURE REVIEW

2.1 Overview of sustainability in households

Sustainability matters, energy and water consumption and their impact are dominant issues in both political and economic debates in most of the countries today. The issue of energy dependence affects both politics and economics from everyday activities (such as transport and household chores) to industrial production and even international markets. There needs to be a general recognition that these issues not only affect governments, but everyone associated with their general activities. In addition to CO2 emission obligations, energy demand above national production levels involves political, economic, and operational interdependence between nations. These energy shortages are putting pressure on countries to improve their energy use in all the sectors in a sustainable way. This includes improving energy use at home which consequently it is influenced by the energy efficiency of domestic appliances and electronics. Within the larger macroeconomic and geopolitical framework, it must be kept in mind that energy conservation at home cannot be seen as the sole responsibility of households but must involve a wider range of stakeholders. The same can be said for the pollution generated while scrapping domestic appliances as their plastics or metal finishings are harmful for the entire ecosystem. Consumers, service providers (including retailers), governments and multinational organizations need to work together to get the best energy savings and product materials to prevent further issues. A relevant percentage of household energy consumption is associated with the use of large and small appliances as they are highly dangerous for the environment.

2.2 Consumer purchasing behaviors and sustainable domestic appliances

Depending on the appliance we consider, there might be different product life cycles for each of it. On an average, appliances replacement should be done 5-6 times in 35 years. In some cases, it can be done every 5 years to optimize the life cycle of the device (Kim et al., 2006). In reality, according to different surveys taken around the world, it has been discovered that between 40% and 60% of worldwide domestic appliances were replaced after 10/15 years of use. This shows the gap between what the exchange frequency should be and what actually is. Therefore, given the long period of use of the device by consumers before replacement, any intervention in the appliance will encourage the purchase of the best model in terms of energy efficiency and sustainable considerations to consume as little energy as possible and benefit from sustainable materials less harmful for the environment in the subsequent use. This can be achieved through the collaboration of: (1) device makers, it means by offering a wide variety of sustainable devices; (2) sellers and distributors, namely by providing consumers with effective information and persuading them to buy the best appliances in terms of sustainable matters; and (3) consumers, by purchasing the "greenest" domestic appliances. Besides the drawback of a long device change interval, there are some advantages. Because these are infrequent, medium, or long-term decisions, the factors and traits that matter most to people are different than those that influence other kinds of decisions. There is some available evidence as to whether it matters. Young (2008) suggests that when consumers make these purchases, they consider not only characteristics related to the purchase itself, but also characteristics related to more long-term aspects. For example, while people evaluate the cost of devices, they also appreciate the long-term savings due to the lower energy consumption and the sustainable finishings of certain types of devices which make the appliance more durable. In addition to that, some consumers conduct cost-benefit analyses, by looking at aspects such as future energy price rates (Young, 2008). However, purchasing decisions do not always include a cost-benefit analysis that considers all the relevant economic, social, and environmental benefits. There are obstacles and limitations to conduct such analyses, which can result in unintended ways of making choices based on product characteristics that consumers normally consider (Gaspar et al., 2010, 2011). Therefore, there is evidence that cost-effectiveness analyses and considerations are complex to make. This is because people generally have limited awareness of the sustainable attributes of domestic appliances, the price

they pay for energy consumption, and the general price of products (Yamamoto et al., 2008). Another important aspect is that while many studies show that people are willing to pay more for sustainable and energy-efficient appliances, few actually do, and the other aspects, such as the cost of the appliance, its perceived quality and the brand producing it, sometimes become more important in the purchase decision making process (Banerjee and Solomon, 2003). Some other studies suggest that the device selection depends on characteristics other than the selling price (Yamamoto et al., 2008). For many individual consumers, economic aspects (such as the initial cost) might be less important than the device's warranty, the long-term (energy wise and financially wise) savings they enable, and other psychosocial variables such as the perceived money and energy savings, the quality of the energy services and the perceived changes in comfort and convenience enabled by the sustainable materials (Ball et al., 1982).

2.3 Factors and barriers to the adoption of sustainable domestic appliances in households

The literature has different and sometimes contradictory results on the most relevant basic factors and drivers that people consider when choosing a domestic device. Furthermore, few studies have specifically analyzed what determines energy efficiency and sustainable considerations in domestic appliance selection. Most of these studies focus on the impact of energy labeling while considering specific energy efficiency classes when choosing the appliances at the time of the purchase, but none of them focus on the design of the product or on the selection of sustainable and recycled materials. These studies suggest that labels should not only provide information on efficiency and sustainability, but also directly facilitate actual purchases by indirectly influencing choice (DuPont, 1998). However, it should be kept in mind that consumers generally do not always have the ability nor the opportunity to consider all the information provided on the eco label (Dyer and Maronick, 1988). For a label that directly encourages the purchase of a particular appliance, it should be seen by the consumers at the store (be present), then it should be understood (information is provided in a clear and simple manner), viewed as trustworthy, and eventually the appliance should be considered as useful in the purchase decision-making process (Thøgersen, 2000). An exception going beyond the importance of labels when considering sustainability classes is the study by Mills and Schleich (2009), which evaluates the determinants of purchasing sustainable and high-efficiency appliances through simulation. This study shows that the selection does not depend largely on

sociodemographic characteristics. For example, a rise in the household income and having an academic degree did not significantly affect the selection of more sustainable and efficient appliances. On the other hand, the most important aspects are related to the characteristics of the home, especially its age, meaning that homes built after 2002 are more likely to have household choices in favor of high-efficiency and sustainable appliances. Local energy prices are also affecting the choice of some appliances for some others. For this reason, Mills and Schleich (2009) suggest that an 'attribute-based approach' to sustainable selection is important but not sufficient, given the importance of psychosocial variables such as attitudes, beliefs, and perceived benefits. According to the existing literature, there are no studies or projects that assess device attributes, psychosocial and socioeconomic variables comprehensively. Finally, given the barriers to sustainable considerations in domestic appliances selection, especially the limited impact of labels and the skeptical perception towards the higher prices for sustainable options, the role of some key players in this equation becomes clear. Sales assistants and technical staff at the point of sale could influence the type of device features that consumers consider in stores and the order in which the latter consider them. Consumer interactions may also increase the likelihood that the information provided will be used in the selection process (Anderson and Claxton, 1982). From this perspective, the store's sales staff can be viewed as another relevant factor for the sustainable considerations during the purchase decision process of domestic appliances.

2.4 Domestic appliances characteristics considered in the sustainable purchase choice

Through the study carried out in the paper by Gaspar and Antunes (2011), it has been tried to identify the most relevant selection drivers that consumers consider when purchasing different types of devices such as large, small, and technological. A survey has been conducted where consumers were about to purchase a device (at the time of inquiry or in the near future) so that they could assess the decision-making factors as early as possible at the time of the selection. It shows that cost and quality are at the top, and energy consumption is the fourth most considered. Looking at each device type individually, cost was considered the most important when choosing large and small devices, while quality was considered the most important attribute when choosing technological devices. Also, the most common reason people buy devices was to replace an old, broken or poorly performing device. When it comes to the

environmental concerns, the three most reported variables are energy efficiency, energy label class and water consumption. We could argue that the main characteristics considered in the domestic appliance selection are: cost, quality, a balance between quality and cost, and energy consumption. Therefore, to increase purchases of sustainable appliances, these factors should be assigned to sustainable classes. For example, with newer and more efficient models in the market, more sustainable and higher energy classes may be associated with higher quality, potentially reinforcing the argument that those attributes should be considered when purchasing.

Moreover, although cost is the most important aspect in the selection, this aspect can be restated or related to another relevant aspect identified in the literature: the long-term consumption and associated savings (e.g., Ball et al., 1982). Similarly, energy consumption also tops the selection criteria, indicating that consumers tend to consider energy-related aspects when making choices. Other aspects were also moderately but frequently considered when choosing the device as environmental aspects and long-term savings. This strengthen the idea that consumers in general appear to be susceptible to these aspects, and thus there is an opportunity here to reinforce these already existing predispositions. Moreover, store sales staff (and their managers and trainers) play an important role in facilitating the considerations of green and sustainable issues. According to the literature (Gaspar and Antunes, 2011), most of the consumers rely on store sales assistants as their primary source of information while looking for information about devices capabilities and features. In addition to that, consumers reported positive attitudes toward sales staff, as the reviewed literature surveys indicated that staff opinions were valued and trusted. Furthermore, sales assistants are likely to have the greatest (positive) impact on consumers' choice of sustainable models, as they can be present and available immediately prior to and at the time of the purchase. Therefore, it is necessary not only to help consumers in the pre-decision stage (finding information, determining characteristics relevant to their selection, etc.), but also to train sales staff to inform and ultimately convince the consumer precisely at this point. For the reasons explained above, we can conclude that sales assistants should be regarded as the front and most important “pro-environmental change agents” and for this they should be trained in comprehending the consumer pain points in the purchase decision making process and in how to adapt the promotional message based on the different consumer profiles.

2.5 Different consumer profiles

Through the literature it is also possible to identify different consumer profiles which can help in building meaningful messages when addressing sustainable domestic appliances. This increases the chances of success in promoting sustainable messages as it considers the differences in interests, needs, motivations, and factors that are typically considered when making choices. The most relevant factors considered by the existing literature are gender, age group, and accompanied or unaccompanied selection at the time of purchase. About gender, findings from Gaspar and Antunes (2011) show that women consider environmental aspects such as energy and water consumption together with the product design appearance way more than men when making purchasing choices. Men, on the other hand, pay significantly more attention to the number of features and marginally significantly more attention to the accessories and technological innovations the device offered. Other characteristics such as energy efficiency class considerations, were not significantly different between males and females. On the age, Gaspar and Antunes (2011) split the respondents into 4 intervals groups as the following: < 30 years; 31-37 years; 38-47 years; > 48 years. Their findings showed that people in the > 48 interval were more likely to consider environmental factors in their purchasing decision process rather than younger people taking part of the other intervals. The same is valid also when it comes to social issues, country of origin of the appliance, and long-term savings. The opposite holds when buying in sales or promotions, with older buyers being significantly less frequent. Going on with other findings from Gaspar and Antunes (2011), in terms of selection factors, the respondents in the 31–37-year age interval paid less attention to their water consumption. Respondents aged 38-47, on the other hand, place less emphasis on the appliance brand and model. Respondents in the oldest quartile value usability more, while those in the youngest quartile value brand, design, and product version more. Regarding whether the consumer is accompanied or unaccompanied at the time of purchase, the majority chose with their spouse or friend, followed by those who decided alone. Other forms of choice assistance included decisions made in the presence of parents and children. Co-shopping respondents considered environmental aspects, such as energy and water consumption, sustainable finishings of the appliances and cost-quality trade-offs to a greater extent in their purchasing choices than those who shopped alone.

The results out of the existing literature (Gaspar and Antunes, 2011) point that women pay more attention than men to environmental aspects in general and to aspects of energy and water use

in particular. Although results from the literature are based on different and incomparable samples, caution should be exercised in applying these results to all men and women. They just indicate that women place more emphasis on energy efficiency, and women are more likely than men to make choices considering environmental aspects. It is also found that men value other aspects more, such as innovation, accessories, and number of features. Therefore, persuading men to think about environmental issues may be more successful if we can associate traits that are more relevant to men with sustainable attributes.

It is also important to take into account whether consumers are accompanied or not during the purchase. In the study carried out by Gaspar and Antunes (2011), respondents who are with family members and friends appear to be more likely to consider aspects of sustainability and energy efficiency and search for information on those related aspects. This may indicate that when consumers go to the store with others to buy domestic appliances, they tend to take the sustainability class of appliances into consideration. As a result, they are more likely to be persuaded by the sales staff towards that direction. All these observations analyzed by the existing literature can influence the design of targeted messages used to attract consumers. They can be used through media or store-based campaigns (e.g., by store staff). These should be matched to the various identified profiles (based on gender, age and accompanied selection) and the characteristics deemed more important in each case. In addition to that, persuasion can consider outcomes corresponding to different profiles, which are therefore integrated.

2.6 Limitations of literature review

After having analyzed the existing literature on the research topic of this thesis, it is possible to highlight some of its possible limitations.

It has been said several times that sales assistants and employees in store play a crucial role in impacting consumers' choice towards sustainable models of domestic appliances. Undoubtedly, sales staffs could be trained more effectively in order to forecast and better comprehend consumer behaviors when it comes to sustainable choices. Nevertheless, the existing literature does not often mention the relevance of online communication of sustainable benefits. Nowadays, businesses have a lot of online tools through which they can push whatever sort of messages and eventually educate, inform, and convince the final consumer about it. For instance, companies can take advantage of the power of social media, such as Instagram, Tik-Tok, LinkedIn, and Twitter. These tools could not only rapidly spread sustainable messages in

a viral way, but they can also teach consumers about the meaning of the latter in a visual and simple way. The literature does not refer much also to the possibility for companies of attracting and informing consumers through the signings of partnerships with retailers or famous people, often referred as influencers. When it comes to the small kitchen appliance domain, many companies are used to undertake collaborations with important chefs, cuisine schools or influencers that can help spreading sustainable messages in a trustworthy way. Philips Domestic Appliances (called Versuni since February 2023), for instance, launched an application called NutriU, which through banners, push notifications, and targeted messages helped the company sustainable set of small kitchen appliances (kettle, toaster, and drip filter coffee maker) gain traction and this turned into higher sales and margins (Philips Domestic Appliances internal data, 2022).

Another limitation found in the literature, is the lack of clustering of the consumer profiles into different geographical areas. The existing literature is mostly focused on the variables age, gender, and the fact of being accompanied or not at the time of the purchase when it tries to draw different consumer profiles. The geographical area is a relevant variable that can be added to the before mentioned ones as according to the different areas, consumers might have different knowledge, interests, motivations, and willingness to pay for a certain product. In that case there might be different managerial implications for businesses and as a waterfall, different strategies would be put in place to communicate sustainable benefits to the final consumer, taking also into account the geographical area where the consumer comes from.

This is the case of Philips Domestic Appliances, which adapted its sustainable marketing activation assets for the launch of its Eco Conscious collection both offline and online differently in South Korea or other APAC countries than in Europe. (Philips Domestic Appliances internal data, 2022).

2.7 Suggested model of the attitude towards sustainable small kitchen appliances adoption among Benelux consumers

After having analyzed the existing literature and its limitations on sustainable small kitchen appliances, a research model has been created.
All the factors which have been found to have an effect in the consumer's purchasing decision making process are going to be presented below with their relative hypotheses.

Perceived Brand Image

As mentioned by Banerjee and Solomon (2003) and Gaspar and Antunes (2011), when it comes to the actual purchase of sustainable small kitchen appliances there are several variables that come into play and the Perceived Brand Image of the products into consideration can influence the purchase intention for Benelux consumers.
H1: Brand image is the most important driver when it comes to small sustainable kitchen appliances for Benelux consumers.

Long-Term Environmental Considerations

As backed by Young research (2008), consumers make Long-Term Environmental Considerations when evaluating the purchase of sustainable small kitchen appliances. They appreciate long-term savings in terms of energy consumption, and the sustainable materials the products are made up. It is relevant to understand at what extent these considerations impact the purchase intention toward sustainable small kitchen appliances for Benelux consumers.
H2: Long-term environmental considerations are not a key driver for the adoption of sustainable small kitchen appliances for Benelux consumers.

Willingness to pay a Price Premium

As highlighted in the research by Gaspar and Antunes (2011), the price of sustainable small kitchen appliances assumes great relevance in the purchase decision making process. This is supported also by Banerjee and Solomon (2003) as one of the top variables prior and during the purchase. Moreover, according to Banerjee and Solomon (2003), even though many studies show that consumers are willing to pay more for a sustainable appliance, few in reality do.

That's why it is relevant to understand how willing Benelux consumers are to pay a higher price for a sustainable appliance.

H3: Benelux consumers would not pay a premium for the perceived benefits of sustainable small kitchen appliances.

Perceived Higher Prices

Complementary to the previous hypothesis and backed by the research carried out by Gaspar and Antunes (2011), price can be seen also as a barrier in the purchasing choice.

It is worthwhile to understand to what extent the higher prices of sustainable small kitchen appliances can be seen as a barrier in the consumers' purchase intention.

H4: The higher prices of sustainable small kitchen appliances can be seen as a barrier in the purchasing decision making process for Benelux consumers.

Level of Awareness

Supported by the research from Yamamoto (et al., 2008) consumers have limited awareness when it comes to sustainable appliances features, their price, and how they can contribute in terms of energy savings. Also, according to Dyer and Maronick (1988) consumers do not have neither the ability nor the opportunity to consider all the information provided on the eco labels at the time of the purchase.

H5: Benelux consumers have a low level of awareness of sustainability in the domain of small kitchen appliances.

Perceived Effective Communication

As stated by Gaspar and Antunes (2011), store sales assistants can affect the purchase intention toward sustainable small kitchen appliances remarkably as they are relied on by consumers and the latter have positive attitudes to them. So, the more effective the communication of sustainable benefits of sustainable small kitchen appliances, the higher the likelihood consumers would use it in the selection process (Anderson and Claxton, 1982), and eventually perceive the kitchen appliance as reliable and useful prior and during the purchase, as highlighted by Thøgersen (2000).

H6: Benelux consumers would buy more sustainable small sets of kitchen appliances if they were more effectively informed and educated.

Potential Target Audience

As mentioned in the limitations of the existing literature, the clustering of the user profile into different geographical areas has not been considered yet. However, in this research the attractiveness of the Benelux target market is evaluated. So, the Benelux consumers' interest in whether buying a sustainable small kitchen appliance or replacing a standard product with a sustainable option is measured.

H7: Benelux consumers can be considered a target audience for sustainable small kitchen appliances.

Sub-Group differences

As pointed out by the study conducted by Gaspar and Antunes (2011), consumer behaviors might differ between men and women. It is stated that women are more concerned about the environmental and sustainable aspects of sustainable small kitchen appliances while men are more interested in innovative and technological features.

H8: Women are more concerned about environmental aspects, so they are more inclined to buy sustainable small kitchen appliances.

Being accompanied or not

As mentioned again in the consumer research by Gaspar and Antunes (2011), consumers who were in presence of family members and friends consider more sustainable and energy efficiency aspects of sustainable appliances. This can bring relevant implications when it comes to the communication of targeted messages towards consumers.

H9: Being accompanied during the purchase means considering more sustainability aspects of small kitchen appliances.

3 METHODOLOGY

3.1 Research approach

This study intends to evaluate how Benelux consumers perceive and intent to buy sustainable small kitchen appliances. The present research was carried out using deductive research.

The deductive and inductive techniques are two "broad methods of reasoning" according to Trochim (2005). The primary distinction between the two strategies is that whereas the deductive strategy begins with the general and finishes with the specific, the inductive strategy accomplishes the exact opposite by moving from the particular to the general.

According to Wilson J. (2010), the deductive approach is a method of inquiry “concerned with developing a hypothesis based on an existing theory, and then designing a research strategy to test the hypothesis." By taking advantage of the deductive approach, this study will follow a “top down” approach, as it will start from theories which lack a full validation to test new hypotheses coming from the former theories.

At first, qualitative research has been carried out thanks to interviews through which it is possible to get a better understanding of consumer behaviors.

On one hand, interviews allow the interviewer to gain an understanding about attitudes, beliefs and ideas coming out of the respondent, but on the other hand, it can happen that the interviewer indirectly influences the answers (Malhotra et. Al, 2020).

After the qualitative research, quantitative research has been carried out to test the insights got in the previous step. An online questionnaire has been sent out to the target audience by exploiting social media tools as WhatsApp, LinkedIn, and Instagram. A large number of answers has been collected in a time frame of a few days and the data collected out of the questionnaire have been analyzed through Python statistical software..

3.2 Research Design

3.2.1 Interviews

In-depth interviews have been done to confirm or disprove the results from the literature review. In-depth interviews are one of the primary techniques used in qualitative research to gather data (Ritchie and Lewis, 2003). Because of the close contact with the participants, this technique allows the interviewer to comprehend the participants' thoughts, feelings, and emotions. Additionally, it gives the interviewer the option to choose the desired sample in order to get more insightful information (Neale, 2009). Since face-to-face interviews are informal, it is simpler to help the participants and provide all the required clarifications so they can comprehend the questions better (Neale, 2009). The goal of this research is to understand the decision-making process prior and during the purchase of sustainable small kitchen appliances for Benelux consumers. The sample consisted of 15 respondents aged from 21 to 26 years old, 8 women and 7 men. 11 out of the 15 people taking part of the interviews were whether from The Netherlands or Belgium, while the remaining 4 were not Benelux citizens but they have been living there for at least 1 year. All the interviews lasted for around 20-25 minutes, where some were carried out face to face and some others online through whether FaceTime or Zoom video calls. The interviews started with a small overview about the goal of the present thesis and the objectives of the interview. Just one script has been developed as for most of the interviewees it was their first time dealing with the topic of sustainable small kitchen appliances. Some of the questions were related to the perceived factors and barriers which could influence the purchase of a sustainable small kitchen appliance. It has been asked also how respondents feel about paying a price premium for a sustainable option, what is their current perception and why they are skeptical or not towards the adoption of a sustainable small kitchen appliance in the near future. It has been talked also about the way the different stakeholders in the equation (companies, sellers, distributors, suppliers) communicate and spread sustainable messages and how this could be further improved.

3.2.2 Online Questionnaire

As a way of whether validating or rejecting the previous results, an online questionnaire has been distributed to potential Benelux consumers. The survey was present just in English and not in Dutch and French as the target group of this study are mainly people from the Dutch Randstad region and the Belgian Flemish region, where English is widely spoken as the second language. An online survey enables the researcher to collect a significant amount of data quickly and cheaply from a target population and it used to learn about their preferences, behaviors, and opinions (Nayak, Narayan; 2019). The questionnaire in consideration has been distributed through the most common social channels used by Benelux consumers, namely WhatsApp, Instagram, and LinkedIn. The survey consisted in 13 questions divided in 4 different blocks. Before the questions section, it has been included a page showing the sustainable breakfast set of Philips DA small kitchen appliances, namely a kettle, a toaster, and a coffee maker. Below their picture, a few lines explaining what their characteristics have been added in order to help the respondents getting familiar with the topic. The first block investigated the factors of sustainable small kitchen appliances that could affect the consumer purchase decision making process. The second section aimed at understanding what are the potential purchase barriers for the adoption of small sustainable kitchen appliances. On the other hand, in the third block the potential user profile of sustainable small kitchen appliances is analyzed. The online questionnaire ended with a socio-demographics block were questions about gender, age range and education are collected.

3.3 Data Collection

3.3.1 Primary data collection

3.3.1.1 Interviews Findings

Nine interviews have been carried out face-to-face, while the remaining six took place through video calls. The saturation point has been reached after the 15 interviews, as any incremental interview did not lead to more and new information. Most of the interviewees validated most of the hypotheses found in the literature which are also mirrored in the research questions of the present thesis. No new hypotheses have been added after collecting primary data through interviews.

When it comes to sustainable small kitchen appliances, most of the participants agreed that their purchase intention is affected by a combination of different factors as price, quality, functionalities of the device, the brand taken into consideration, the design and finishings of the product, and environmental considerations. However, thirteen out of fifteen respondents said that price and brand image would be the key drivers prior their sustainable small kitchen appliances purchases, and this validates one of the hypotheses of this research. Consumers care about getting an appliance durable and performing that justifies the initial expenditure. All the interviewees would go for a product from a recognized brand independently of the sustainable features as they feel it as more trustworthy and reliable. Half of the participants in consideration seem not to be that driven by sustainable specifications, rather by functionalities and trust in the brand image. Interestingly, fourteen out of fifteen participants would not be willing to pay a premium for a sustainable product but for different and independent reasons between themselves. Ten out of the fifteen interviewees explained their lack of willingness to pay a premium because of mere financial considerations, as especially the Gen Z chunk of consumers stated they do not have enough money to afford sustainable small kitchen appliances. The other five would be potentially willing to pay a % more for a sustainable product but they want to clearly understand what the advantages are of going for a sustainable small kitchen appliance. It emerges that consumers want their sustainable investment to be justified otherwise they just stick with a standard product. Another point already discussed in the existing literature is still the lack of awareness towards sustainability concepts in kitchen appliances. The participants themselves struggled in comprehending sustainable labels, energy efficiency metrics and what are the medium/long-term impacts of having sustainable kitchen appliances. This points out to a lack of sustainable awareness from the consumer side, confirming one of the hypotheses of this research. Another relevant point discussed during the interviews, is the weak correlation between a sustainable device as a quality one present in the respondents' minds. Again, this highlights on the one hand a lack of effective information from the consumer side which therefore discourages the latter from buying sustainable appliances. On the other hand, it strengthens the concept that one of the key drivers for consumers when purchasing small kitchen appliances is getting something considered to be durable and of good quality for an affordable price. It has been also talked about the role of the different stakeholders in this sustainable equation for small kitchen appliances. All the fifteen interviewees expressed the need for better and more education on sustainable benefits where sales assistants in stores can act as sustainable agents, validating some points already discussed in the literature and in one hypothesis of the present thesis. All the fifteen interviewees' thoughts lead to the fact that

companies, retailers, and stores could do more in terms of spreading sustainable values related to small kitchen appliances and nowadays many ways can be taken advantage of. On the user profile side, seven out of the eight women respondents said that they care about the environmental aspects of small kitchen appliances, and they would switch to a sustainable option. On the other hand, three out of the seven men respondents said they make environmental considerations when it comes to small kitchen appliances while the others were mainly focused on the technological specifications and the performance levels of the appliances. Lastly, four out of the seven men and five out of the eight women mentioned that they would probably look more for sustainable small kitchen appliances if being accompanied, whether by a friend, partner, or parent.

3.3.1.2 Online Questionnaire

All the data collected have been analyzed and studied through Python statistical software. 117 valid responses have been collected in total. Initially, descriptive statistics have been analyzed to get an overview of the characteristics of the sample taken into consideration. Then a correlation matrix and sub-group analysis per age, gender, and education has been done, where the means of the different groups have been studied through ANOVA test. The aim of the latter analyses is to understand which are the factors able to statistically impact the dependent variable namely the purchase decision making process towards sustainable small kitchen appliances.

4 RESULTS

4.1 General sample characteristics

4.1.1 Socio-demographic characteristics

The sample consisted of 117 valid responses from Benelux consumers, namely representing the countries of The Netherlands, Belgium, and Luxembourg. Among the participants, the 50,4% of the sample was male while the 49,6% was female, indicating a sample split almost equally between men and women. When it comes to the age range of the respondents, the 61,5% is included in the 18-24 age range and the 36,7% in the 25-34 age range. The other two age ranges, namely 35-44 and 45-54, are both represented by less than the 1% of the participants. Furthermore, the 46,2% of the respondents' highest level of education is a Master, the 41% has a Bachelor diploma as highest education and the 11,9% of the sample participants has High School as highest level of education.

4.1.2 Descriptive Statistics

The data analysis has been carried out under the assumption that the sample into consideration is representative of the population. The qualitative customer insights (totally agree, partially agree, neither agree nor disagree, partially disagree, totally disagree) have been mapped into quantitative scores, on a scale from 1 (the highest) to 5 (the lowest). The responses 1 and 2 are going to be considered as positive, 4 and 5 as negative, and 3 as not relevant.

4.2 Statistical Analysis

The statistical analysis has been conducted by focusing on each online questionnaire question which represents each hypothesis of the present thesis. The analysis has been built by looking at the relative proportions to which each factor is present in each question as the scores from 1 to 5 are qualitative and subjective to the different points of view.

4.2.1 Research Question 1

This thesis' Research Question 1 dealing with the factors mostly valued by Benelux consumers when it comes to the purchase of sustainable small kitchen appliances has been firstly addressed.

```
# Brand image/reputation

df[['Q1_2']].value_counts(normalize=True)
```

```
Q1_2
1    0.367521
4    0.290598
3    0.196581
2    0.136752
5    0.008547
dtype: float64
```

Brand image/reputation is the factor that was mostly placed at the top of the user rankings; it can be stated that brand reputation is the main driver for the purchase of small sustainable kitchen appliances for the 37% of Benelux customers, although not statistically significant (as only half of the sample placed it in the top two positions).

```
# Energy efficiency features (saving water and energy)

df[['Q1_3']].value_counts(normalize=True)
```

```
Q1_3
1    0.350427
3    0.290598
4    0.179487
2    0.170940
5    0.008547
dtype: float64
```

Similar conclusions as the brand image feature can be made for the Energy efficiency features, with 35% of customers placing it on top of their ranking, and over 50% placing it in the top 2. Given that ~30% of customers placed did not either agree nor disagree with the statement (score of 3), it can be concluded that if saving water and energy influences the buying decisions, this is likely to be not significant.

```
# Design/appearance of the appliance

df[['Q1_4']].value_counts(normalize=True)
```

```
Q1_4
3    0.358974
4    0.299145
2    0.213675
1    0.094017
5    0.034188
dtype: float64
```

With only 9% of customers ranking it at the top position (30% in top 2), it can be said that Design/appearance of the appliance does not show a positive effect on the decision process when buying sustainable small kitchen appliances.

```
# Long-term environmental savings (doing good for the environment)

df[['Q1_1']].value_counts(normalize=True)
```

```
Q1_1
2    0.461538
4    0.213675
3    0.145299
1    0.136752
5    0.042735
dtype: float64
```

```
# To what extent do you agree that your decision to buy sustainable small kitchen appliances might be influenced by long-term environmental considerations?

df[['Q2']].value_counts(normalize=True)
```

```
Q2
2    0.401709
4    0.256410
1    0.179487
3    0.136752
5    0.025641
dtype: float64
```

```
# On a scale from 1 to 5, how concerned are you about environmental aspects of small kitchen appliances (energy and water consumption, sustainable design made by bio-based plastics, packaging)? - Environmental aspects of small kitchen appliance

df[['Q8_1']].value_counts(normalize=True)
```

```
Q8_1
2    0.299145
4    0.273504
3    0.230769
1    0.136752
5    0.051282
0    0.008547
dtype: float64
```

Long-term environmental savings (doing good for the environment) seem to be a driver for the purchase decision making toward sustainable small kitchen appliances: although only 14% of people consider this as the main driver, 60% of consumers placed it in the top 2 positions, sho wing that environmental savings could be indeed a driving factor in the decision process (Q1). These results are aligned with what observed in Q2, also showing that almost the 60% of cons umers think about environmental savings when looking to buy sustainable products. On the ot her hand, with over 40% of the sample not agreeing with the statement that the decision to buy sustainable small kitchen appliances might be influenced by long-term environmental consider ations, it cannot be easily stated that this is a driving factor in the customers' decision process. The statement above is also confirmed by what it is observed in Q8, which shows that only 14% of the sample is fully concerned by the environmental aspects of small kitchen appliances.

4.2.2 Research Question 2

The Research Question 2 of this dissertation treats with the barriers toward the adoption of sustainable small kitchen appliances for Benelux consumers. Statistical considerations on the price, consumers' willingness to pay, awareness and the role of effective communication are going to be addressed.

```
# How likely are you willing to pay a premium for a small kitchen appliance that is environmentally friendly?

df[['Q3']].value_counts(normalize=True)
```

```
Q3
2    0.444444
4    0.264957
3    0.188034
5    0.059829
1    0.042735
dtype: float64
```

```
# To what extent do you agree that the higher prices of sustainable small kitchen appliances discourage you from buying them?

df[['Q4']].value_counts(normalize=True)
```

```
Q4
2    0.444444
1    0.324786
3    0.153846
4    0.076923
dtype: float64
```

```
# Were you aware of the existence of a sustainable breakfast set of small kitchen appliances (kettle, toaster, coffee maker)?

df[['Q5']].value_counts(normalize=True)
```

```
Q5
4    0.324786
5    0.256410
2    0.213675
1    0.119658
3    0.085470
dtype: float64
```

```
# To what extent do you agree that you would buy more sustainable small kitchen appliances if you were better informed and educated about the sustainable benefits through online channels (social media, retail pages) and offline ones (in store)?

df[['Q6']].value_counts(normalize=True)
```

```
Q6
1    0.461538
2    0.393162
3    0.102564
4    0.025641
5    0.017094
dtype: float64
```

```
# What is your highest level of education?

df[['Q13.1']].value_counts(normalize=True)
```

```
Q13.1
Master         0.461538
Bachelor       0.410256
High School    0.119658
Other          0.008547
dtype: float64
```

```
# Are you willing to purchase a sustainable small kitchen appliance in the short or long term, or replace your current appliance with a sustainable option?

df[['Q7']].value_counts(normalize=True)
```

```
Q7
2    0.478632
1    0.222222
3    0.222222
4    0.076923
dtype: float64
```

There seems to be some underlying blockers that do influence Benelux consumers into not buying sustainable small kitchen appliances. The main reason for consumers not buying sustainable products is the lack of information: although almost 90% of the sample has a Bachelor-level or higher university education, only 20% of consumers were aware of the existence of a sustainable breakfast set of small kitchen appliances.

Overall, most of the sample (a considerable 85% share) is willing to buy sustainable devices if they were better informed about their benefits.

One of the reasons for them not spontaneously buying sustainable small kitchen appliances is likely to be the price of these products: only 4% of consumers is fully willing to pay a premium to purchase a sustainable product (Q3) and ~75% of the sample feels that the higher prices of sustainable small kitchen appliances is discouraging them from buying a product that belongs to this category (Q4).

4.2.3 Research Question 3

The third Research Question of this dissertation aims at assessing the potential user profile of sustainable small kitchen appliances. So, characteristics as age, gender, level of education and how the three of them correlate with the purchase intention to buy sustainable devices are analyzed. At first all the consumers that responded positively to the questions about the willingness to buy sustainable small kitchen appliances (Q4, Q7, Q9) are considered.

```
# Age

df[['Q11.1']].value_counts(normalize=True)
```

```
Q11.1
18-24    0.615385
25-34    0.367521
35-44    0.008547
45-54    0.008547
dtype: float64
```

```
# Gender

df[['Q12.1']].value_counts(normalize=True)
```

```
Q12.1
Male      0.504274
Female    0.495726
dtype: float64
```

```
# Education

df[['Q13.1']].value_counts(normalize=True)
```

```
Q13.1
Master         0.461538
Bachelor       0.410256
High School    0.119658
Other          0.008547
dtype: float64
```

If we consider binary classes for categorical consumer features, we can assume that they are equally balanced.

- The sample is almost equally split in terms of gender;
- 46% of the sample has a Master degree (class 1, the rest will be class 2);
- 62% of the sample has an age between 18 and 24 (the most unbalanced of the 3, but not too skewed).

The distributions of the variables age, gender, and education level are shown below:

```
fig, axes = plt.subplots(1, 3, figsize=(14, 6))

plt.suptitle('Distribution of consumer profiling features', fontsize=16)

sns.histplot(df['Q11.1'], ax=axes[0])
sns.histplot(df['Q12.1'], ax=axes[1])
sns.histplot(df['Q13.1'], ax=axes[2])

axes[0].set_title('Distribution of Age', fontsize=14)
axes[1].set_title('Distribution of Gender', fontsize=14)
axes[2].set_title('Distribution of Education Level', fontsize=14)

axes[0].set_xlabel('Age range', fontsize=12)
axes[1].set_xlabel('Gender', fontsize=12)
axes[2].set_xlabel('Education degree', fontsize=12)

fig.tight_layout()
plt.show()
```

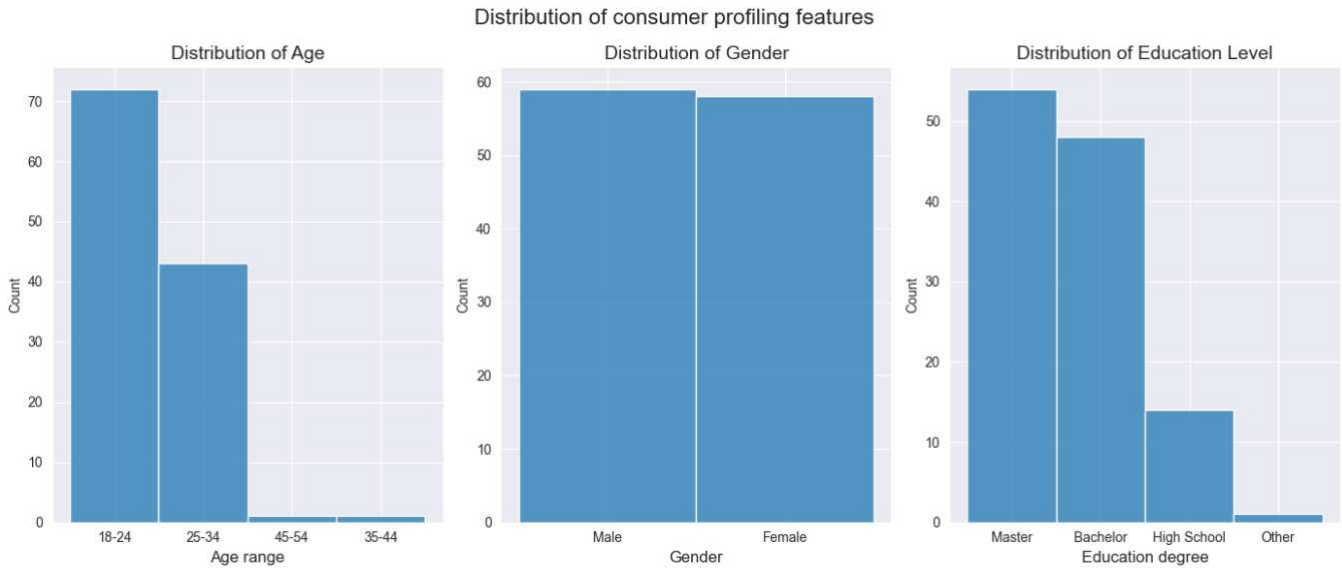


Figure 7 Categorical Variables Distributions

4.2.4 Correlation matrix and sub-group analysis

After having analyzed all the three Research Questions' variables the goal of this thesis is to understand if there is any strong linear correlation between the categorical consumer features as age, gender, and education and the positive purchase intention to buy sustainable small kitchen appliances.

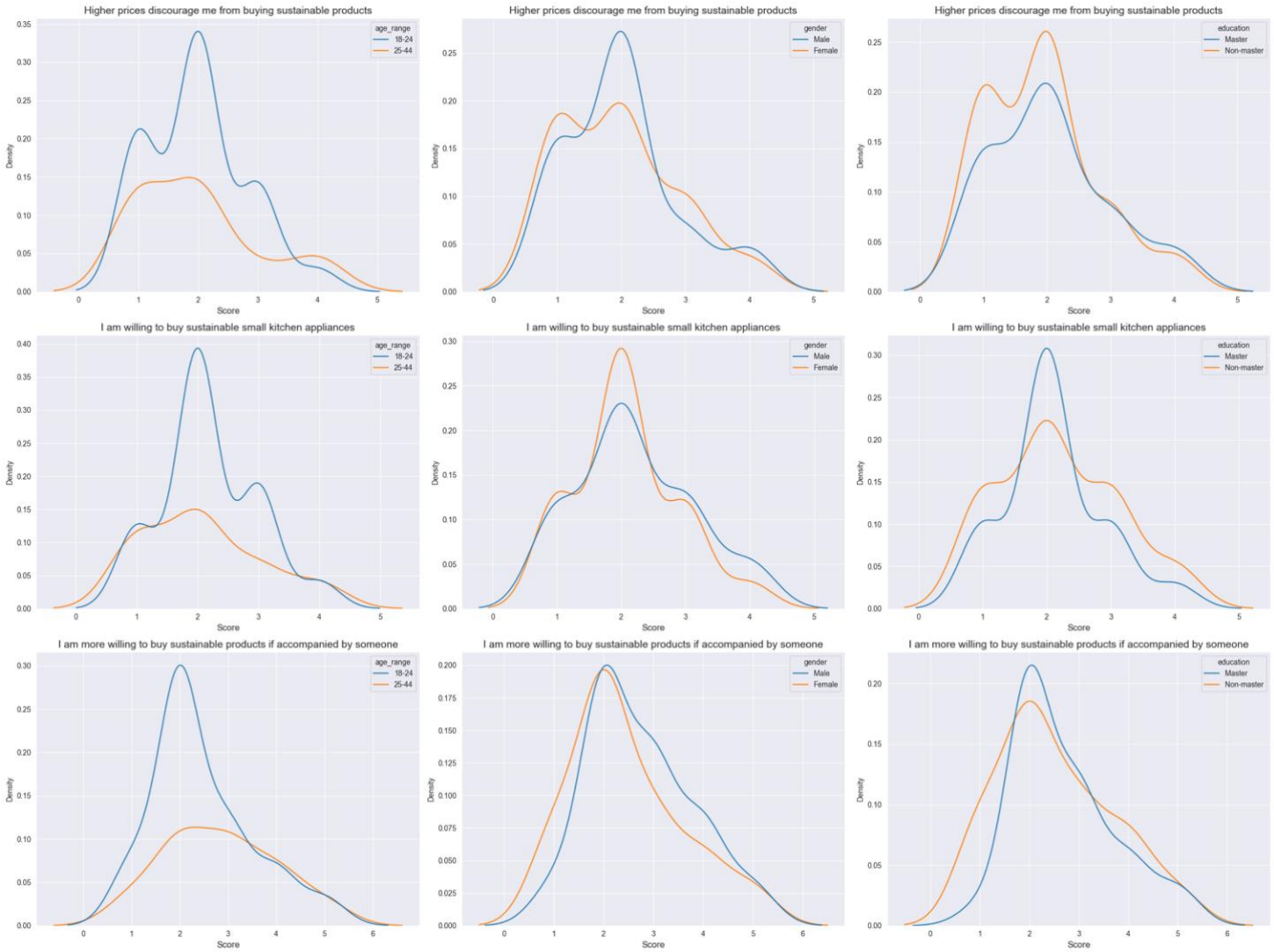
```
fig, ax = plt.subplots(1, 1, figsize=(12, 8))

plt.title('Correlation heatmap between consumer groups and willingness to buy sustainable products', fontsize=14)
sns.heatmap(df[['Q4', 'Q7', 'Q9', 'Q11', 'Q12', 'Q13']].corr(), cmap='Blues', annot=True)

fig.tight_layout()
plt.show()
```

Figure 8 Correlation between consumer groups and willingness to buy sustainable products

In the above graph it can be observed a heatmap displaying the linear correlation (Pearson's correlation coefficient) between our variables of interest. Correlation scores range from 1 (perfect positively correlated features) to -1 (perfect negatively correlated features), with a correlation close to 0 indicating linearly uncorrelated variables.

The question that presents the highest correlation to a categorical variable is Q9 ('Would you consider more the purchase of sustainable small kitchen appliances if you were accompanied by a partner/friend/family member during the purchase?'), that shows a correlation of 0.13 with Q11 (age range). Although there might be difference in purchasing behaviors between different age groups, there does not seem to be any strong statistical evidence of age affecting the outcome of Q9.

Another relevant analysis for the purpose of this dissertation, is to understand how likely different groups of consumers are to buy sustainable small kitchen appliances.




```
# Binary age classes
df['age_range'] = ['25-44' if x != '18-24' else x for x in df['Q11.1']]
# Binary gender classes (already equally split)
df['gender'] = df['Q12.1']

# Binary education level
df['education'] = ['Non-master' if x != 'Master' else x for x in df['Q13.1']]
```

The above density plots allow to extract some insights regarding the distribution of scores for Q4, Q7 and Q9 (willingness to buy sustainable products), with respect to age, gender, and education.

- Age

Since the two classes are more unbalanced for this variable, the focus will be more on the shape of the distributions rather than on the magnitude of the density. By observing the 3 plots on the first columns the following insight can be drawn:

In all plots, a significant difference in distribution between the two age ranges is observed. Given the higher peaks on x values around 2, it can be stated that younger consumers are more prone to buy sustainable products but are also more discouraged by the prices.

- Gender
    - Men are more discouraged to buy sustainable products than women (1,2) - we observe more scores of 2 (discouragement) for men than women;
    - Women are slightly more likely to buy sustainable products than men (2,2) - we observe more scores of 2 (willingness) for women than men;
    - Women are equally slightly more willing than men in buying sustainable products when accompanied by someone (2,3) - we observe a higher left-skewness for men than women.

- Education
    - By observing all the plots above (third column), it can be noticed that consumers with higher levels of education are more willing to buy sustainable products, but also less discouraged by the higher prices.

What is then the target consumer group for sustainable products?

From the insights above, it can be stated that women (especially the ones that received a higher education) are more likely to buy sustainable small kitchen appliances than the other product groups. It can be also concluded that age seems to be a key factor in the decision process, as young consumers would be more likely to buy sustainable products if the prices were lower, while older consumers would not be affected as much from the higher prices but would just be less willing to opt for sustainable purchases.

4.2.5 Hypotheses Testing

H1: Brand image is the most important driver when it comes to sustainable small kitchen appliances for Benelux consumers.

Brand image/reputation is the factor that was mostly placed at the top of users' rankings; it can be said that brand reputation is the most important driver for the purchase of small sustainable kitchen appliances for 37% of Benelux customers, although not statistically significant (as only half of the sample placed it in the top two positions).

H2: Long-term environmental considerations are not a key driver when it comes to sustainable small kitchen appliances for Benelux consumers.

As reported above, this hypothesis is observed to hold for the survey's sample.

Long-term environmental savings (doing good for the environment) seems to be a driver for the purchase decision of sustainable small kitchen appliances: although only 14% of people consider this as the main driver, 60% of customers placed it in the top 2 positions, showing that environmental savings could be indeed a driving factor in the decision process (Q1). These results are aligned with what observed in Q2, also showing that ~60% of customers think about environmental savings when looking to buy sustainable products. On the other hand, with over 40% of the sample not agreeing with the statement that the decision to buy sustainable small kitchen appliances might be influenced by long-term environmental considerations, it cannot be comfortably stated that this is a driving factor in the consumers' purchase decision process.

H3: Benelux consumers would not pay a premium for the perceived benefits of sustainable small kitchen appliances.

The hypothesis seems to hold, as explained above. Only 4% of consumers is fully willing to pay a premium to purchase a sustainable product (Q3).

H4: The higher prices of sustainable small kitchen appliances can be seen as a barrier in the purchasing decision making process for Benelux consumers.

It is likely to be the validated as ~75% of the sample feels that the higher prices of sustainable small kitchen appliances are discouraging them from buying a product that belongs to this category (Q4).

H5: Benelux consumers have a low level of awareness of sustainability in the domain of small kitchen appliances.

As shown by R2: the lack of information seems to be a driver: although almost 90% of the sample has a Bachelor-level or higher university education, only 20% of consumers were aware of the existence of a sustainable breakfast set of small kitchen appliances.

H6: Benelux consumers would buy small sets of kitchen appliances if they were more effectively informed and educated.

It holds as overall, most of the sample (a considerable 85% share) is willing to buy sustainable products if they were better informed about their benefits.

H7: Benelux consumers can be considered a target audience for sustainable small kitchen appliances.

As observed so far, given the lack of information/awareness of Benelux consumers and their reluctancy in preferring sustainable products over non-sustainable small kitchen appliances, this hypothesis does not seem to hold.

H8: Women are more concerned about environmental aspects, so they are more inclined to buy sustainable small kitchen appliances.

It holds, as it has been stated that women are more likely to buy sustainable small kitchen appliances then other product groups.

H9: Being accompanied during the purchase means considering more sustainability aspects of small kitchen appliances.

It does not seem to be a key driver, as there are other variables in the overall picture that overshadow this factor**.**

4.2.6 Anova

Before jumping into building linear models and ANOVAs, a check if the normality assumptions hold for the distributions is carried out. By a visual check from the density plots above, the distributions of our groups look multi-modal rather than Gaussian or log-normal cases in which we could have performed an ANOVA (after a log transformation in the latter case).

To statistically validate the statement above (and check if the required assumptions on our distributions of interest hold) a QQ-plot to validate the assumption of normally distributed residuals can be used. Let's begin with gender, as the two samples have the same size and some of the distributions could slightly resemble a simil-normal density. In this way, if it comes out that normality does not hold for this case, it can be said the same for the rest, allowing to move on and use a non-parametric test.

```
model = ols('Q7 ~ C(gender)', df).fit()  # willingness to buy scores ~ gender
res = anova_lm(model, typ=1)
residuals = model.resid
plot = qqplot(residuals, line='s')
```

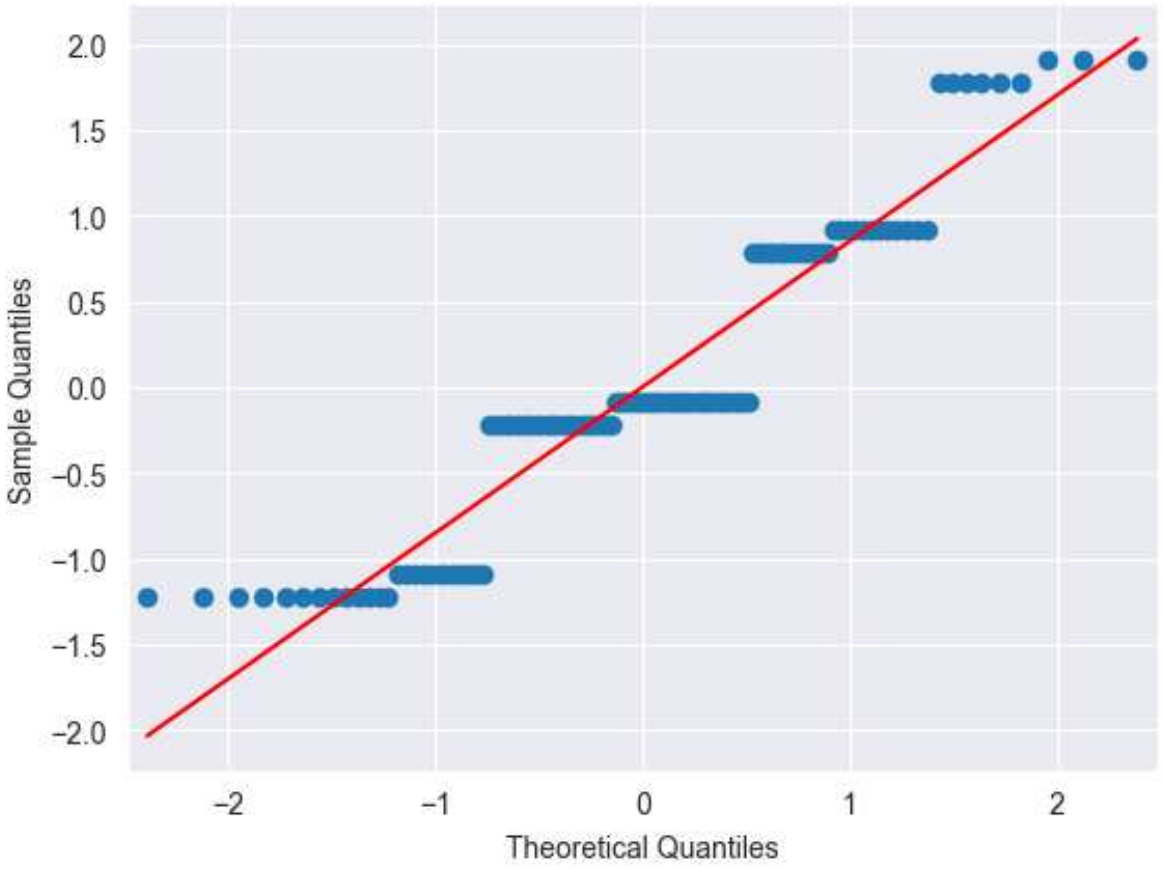


Figure 9 QQ-Plot for Residuals

On the QQ-plot above, the residuals (blue dots) are expected to follow the red line in case their normality assumption was true. In our scenario, it can be safely concluded that it is not the case, therefore the null hypothesis of normality of the residuals can be rejected.

It is possible move on to use a non-parametric test (distribution free): for this use case, a Kruskal-Wallis H-test is performed.

This test allows to assess if the null hypothesis that the population medians of all the groups are equal (which is ideal for this case of skewed distributions) as it is a non-parametric version of ANOVA. The test works on 2 or more independent samples, which may have different sizes (and suits also the age group constraint).

```
stats.kruskal(df[df['gender'] == 'Male']['Q4'].values,
              df[df['gender'] == 'Female']['Q4'].values)
KruskalResult(statistic=0.07511826739096088, pvalue=0.7840253568750755)
```

```
stats.kruskal(df[df['age_range'] == '18-24']['Q4'].values,
              df[df['age_range'] == '25-44']['Q4'].values)
KruskalResult(statistic=0.2687305595329607, pvalue=0.604184597505949)
```

```
stats.kruskal(df[df['education'] == 'Master']['Q4'].values,
              df[df['education'] != 'Master']['Q4'].values)
```
KruskalResult(statistic=0.6187854754145137, pvalue=0.43149896920288044)

```
stats.kruskal(df[df['gender'] == 'Male']['Q7'].values,
              df[df['gender'] == 'Female']['Q7'].values)
```
KruskalResult(statistic=0.5478669479162067, pvalue=0.4591905701871998)

```
stats.kruskal(df[df['age_range'] == '18-24']['Q7'].values,
              df[df['age_range'] == '25-44']['Q7'].values)
```
KruskalResult(statistic=0.8799910223319604, pvalue=0.3482041383352976)

```
stats.kruskal(df[df['education'] == 'Master']['Q7'].values,
              df[df['education'] != 'Master']['Q7'].values)
```
KruskalResult(statistic=0.15690879651152234, pvalue=0.6920186070688087)

```
stats.kruskal(df[df['gender'] == 'Male']['Q9'].values,
              df[df['gender'] == 'Female']['Q9'].values)
```
KruskalResult(statistic=2.5340051789175333, pvalue=0.11141708836456762)

```
# Reject H0

stats.kruskal(df[df['age_range'] == '18-24']['Q9'].values,
              df[df['age_range'] == '25-44']['Q9'].values)
```
KruskalResult(statistic=3.856259526799962, pvalue=0.04956070218146489)

```
stats.kruskal(df[df['education'] == 'Master']['Q9'].values,
              df[df['education'] != 'Master']['Q9'].values)
```
KruskalResult(statistic=1.0290085695627575, pvalue=0.310391639947775)

Among all the null hypotheses that have been tested, only the following (using a significance level of 0.05) can be rejected:

- H0: There is no significant difference in medians between different age ranges when it comes to be more willing to buy a sustainable product when accompanied by someone.

It can be concluded that age is indeed a key driver and the difference between the two observed groups in the sample is significant.

5 CONCLUSIONS AND LIMITATIONS

5.1 Main Findings and Conclusions

Research Question 1: What are the factors Benelux consumers value more of sustainable small kitchen appliances?

By looking at the data analysis, Benelux consumers have different concerns related to the different factors considered when it comes to the purchase intention of sustainable small kitchen appliances. It emerges that Benelux consumers mostly value Brand image/reputation, with the 37% of the respondents ranking it among the top 2 factors, and Energy efficiency features with the 35% of the participants ranking it among the top 2 factors. Interestingly, the design/appearance of the appliance is not something highly valued by Benelux consumers.

When it comes to long-term environmental savings, it seems the latter can be considered a factor in the purchase decision making process. Although 60% of Benelux consumers rank it in the top 2 factors, the 40% of the respondents did not agree with the statement that their purchase intention might be affected by long-term environmental considerations, so it is not possible to address it as a factor.

Research Question 2: What are the barriers for the adoption of sustainable small kitchen appliances for Benelux consumers?

Some barriers have been identified to the purchase intention toward sustainable small kitchen appliances for Benelux consumers. The first barrier is a lack of effective information around this product category, as highlighted by the fact that the 85% of the respondents is willing to buy sustainable small kitchen appliances if they were better informed on the benefits and features. This is strictly correlated to the lack of awareness of this product category, as just around the 20% of the questionnaire's participants said it was aware of the existence of the sustainable breakfast set of kitchen appliances from Philips Domestic Appliances, for instance. Other barriers are the high prices of the sustainable sets of appliances, and the lack of willingness to pay a premium for a sustainable appliance. Just the 4% of the sample is fully willing to pay a premium and the 75% is discouraged from buying a product belonging to this category by the prices considered to be too high.

Research Question 3: What is the user profile of sustainable small kitchen appliances?

Relevant findings have been found through the analysis of the demographics and further through a sub-group analysis for gender. It comes out that younger consumers, namely the ones taking part of the 18-24 age range are more likely to buy sustainable small kitchen appliances, however they are the ones more discouraged by the high prices of the latter. The results of the analysis show also that women are more likely to have the purchase intention to buy sustainable small kitchen appliances than men, and in addition to that, the latter are more blocked by the high prices of the devices. Moreover, the analysis indicates that being accompanied by someone during the purchase does not statistically affect the purchase intention of consumers, regardless of their gender. Thus, when the education level is included in the equation, it can be said that the higher the level of education of the consumer, the higher is the likelihood this consumer would engage in the purchase of a sustainable small kitchen appliance.

5.2 Managerial Implications

Although the existing literature presents several studies on how sustainability plays a role in the purchase intention of sustainable small kitchen appliances, some of them put their focus on the technical specifications of the appliances, some others do not consider the different markets companies target their appliances to, and consumer purchasing behaviors are not explored in depth. This research aims at analyzing psychosocial and socioeconomic variables comprehensively when it comes to the purchase intention toward sustainable small kitchen appliances for Benelux consumers.

Furthermore, this thesis suggests interesting managerial implications for small kitchen appliances companies.

First, as highlighted by the data analysis, brand image/reputation and the energy efficient features are the most valued factors when it comes to the purchase of sustainable small kitchen appliances. Companies should create more and more a sustainable and trustworthy brand image, by engaging in corporate social responsibility activities for instance and by producing goods in a more sustainable way. Moreover, the energy efficient features should be made clear and easy to understand for the final consumers, as the latter often do not have neither the knowledge nor the opportunity to understand them properly. Companies should be clear on what the benefits and added values are of purchasing a sustainable small kitchen appliance. As pointed out by the in-depth interviews and by the online questionnaire, Benelux consumers think that better and more effective spread of information and education would increase the likelihood of engaging

in purchase behaviors. This would translate in greater awareness from the consumer side, and the entire sustainable "ecosystem" would be better off, as companies would increase their sales on sustainable products improving their brand image and their financials, and consumers would start to switch their purchases toward sustainable options, doing good for their households and the environment.

As also revealed by the interviews, consumers care a lot about the price of sustainable options. There is a low level of willingness to pay a premium for a sustainable product and most of the consumers see the high prices as a barrier in their purchase intention. That's the reason why companies should try to make prices more affordable in order not also to attract already existing users but also to expand into the non-user category. Price considerations are even more important for GenZ consumers, the age range between 18 and 24 years old, and according to the data analysis they are the most inclined and willing to engage in the purchase behavior of sustainable small kitchen appliances.

Additionally, through the sub-group analysis it is possible to understand that women are more interested in the purchase of sustainable appliances, so this might be another relevant implication for companies as they should account for different user profiles.

5.3 Limitations and Future Research

The present thesis also exhibits some limitations. First, there is a lack of accuracy in the number of responses got from the online questionnaire. 117 valid responses have been collected and this sample is not representative enough for the Benelux target group of consumers. It can be said also that the sub-group analysis for gender was not fully representative as the sample was very small. In addition to that, more than half of the survey's participants were coming from the same age range (18-24).

During the in-depth interviews and online survey, the answers could be biased as the participants have been shown a sustainable breakfast set of small kitchen appliances from Philips Domestic Appliances.

For future research, a larger sample should be analyzed, and the different age ranges should be represented more equally.

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Appendices

Appendix I: Interview Script

Hi, I am Riccardo, and I am currently conducting some research on how sustainability can impact the purchase intention toward sustainable small kitchen appliances as part of my Master thesis.

- If you were up to buy a sustainable small breakfast appliance, which factors would you consider the most?
- Would you pay a premium for a sustainable small kitchen appliance? If yes, why? If no, why?
- Why do you think people are still skeptical about buying sustainable domestic appliances? Which could be the most important barriers in the purchasing decision making process of sustainable domestic appliances?
- What do you think companies can do in promoting the adoption of sustainable domestic appliances?
- Do you think sustainability should be better communicated also in stores by sales staff/employees and online by dedicated promotions and adv? If yes, why, and how?
- Would you consider more sustainability aspects of small kitchen appliances if you were accompanied by somebody? If yes, why? If no, why?

Appendix II: Online Questionnaire

Hello! I am conducting a survey to understand the relationship between small kitchen appliances and the value of sustainability in this sector. Small kitchen appliances refer to appliances such as toasters, coffee makers, and electric kettles, among others.

In the picture above, a sustainable breakfast set of Philips small kitchen appliances, including respectively a kettle, toaster and coffee maker are shown. This breakfast set is characterized by a sustainable design, it is made up of bio based plastic housing, it offers energy saving functionalities (in terms of water and energy consumption) and it is sold in a sustainable packaging.

1st Block

- What factors influence your decision to purchase a sustainable small kitchen appliance? Please rank the following factors in order of importance: a) long-term environmental savings; b) brand reputation/image; c) sustainable and energy efficient features; d) design/appearance of the appliance; e) other
- To what extent do you agree that your decision to buy sustainable small kitchen appliances is influenced by long-term environmental considerations? a) strongly agree; b) somewhat agree; c) neutral; d) somewhat disagree; e) strongly disagree
- How likely are you willing to pay a premium for a small kitchen appliance that is environmentally friendly? a) extremely likely; b) somewhat likely; c) neutral; d) somewhat unlikely; e) extremely unlikely

2nd Block

- To what extent do you agree that the higher prices of sustainable small kitchen appliances discourage you from buying them? a) strongly agree; b) somewhat agree; c) neutral; d) somewhat disagree; e) strongly disagree
- Were you aware of the existence of a sustainable breakfast set of small kitchen appliances (kettle, toaster, drip filter)? a) definitely yes; b) probably yes; c) might or might not; d) probably not; e) definitely not
- To what extent do you agree that you would buy more sustainable small kitchen appliances if you were better informed and educated about the sustainable benefits through online channels (social media, retail pages) and offline ones (in store): a) strongly agree; b) somewhat agree; c) neutral; d) somewhat disagree; e) strongly disagree

3rd Block

- Are you willing to purchase a sustainable small kitchen appliance in the short or long term, or replace your current appliance with a sustainable option? a) definitely yes; b) probably yes; c) might or might not; d) probably not; e) definitely not
- On a scale from 1 to 5, how concerned are you about environmental aspects of small kitchen appliances (energy and water consumption, sustainable design made by bio-based plastics, packaging)? Numerical scale from 1 to 5
- Would you consider more the purchase of sustainable small kitchen appliances if you were accompanied by a partner/friend/family member during the purchase? Yes/No/Unsure

Demographics

- What is your age range? A) 18-24; b) 25-34; c) 35-44; d) 45-54; e) 55 or older
- What is your gender? A) Male; b) Female; c) non-binary/third gender; d) prefer not to say
- What is your highest level of education? A) PhD; b) Master; c) Bachelor; d) High School; e) other

Appendix III: Extra Test

In case our assumptions were met, we could have also used a Tukey's HSD test, for comparison of multiple groups (which would have given the same result):

```
def compute_tukey_hsd(df: pd.DataFrame, x: str, y: str) -> None:
    comparison = MultiComparison(df[y], df[x])
    comparison_results = comparison.tukeyhsd()
    display(comparison_results.summary())
```

compute_tukey_hsd(df, 'gender', 'Q7')

Multiple Comparison of Means - Tukey HSD, FWER=0.05

group1	group2	meandiff	p-adj	lower	upper	reject
Female	Male	0.1341	0.3997	-0.1802	0.4485	False

In [52]:

compute_tukey_hsd(df, 'age_range', 'Q7')

Multiple Comparison of Means - Tukey HSD, FWER=0.05

group1	group2	meandiff	p-adj	lower	upper	reject
18-24	25-44	-0.1056	0.5193	-0.429	0.2179	False

In [53]:

compute_tukey_hsd(df, 'education', 'Q7')

Multiple Comparison of Means - Tukey HSD, FWER=0.05

group1	group2	meandiff	p-adj	lower	upper	reject
Master	Non-master	0.0794	0.6197	-0.2365	0.3953	False

In [54]:

compute_tukey_hsd(df, 'gender', 'Q9')

Multiple Comparison of Means - Tukey HSD, FWER=0.05

group1	group2	meandiff	p-adj	lower	upper	reject
Female	Male	0.2802	0.1655	-0.1175	0.678	False

In [55]:

compute_tukey_hsd(df, 'age_range', 'Q9')

Multiple Comparison of Means - Tukey HSD, FWER=0.05

group1	group2	meandiff	p-adj	lower	upper	reject
18-24	25-44	0.3861	0.0621	-0.0199	0.7921	False

In [56]:

```
compute_tukey_hsd(df, 'education', 'Q9')
```

Multiple Comparison of Means - Tukey HSD, FWER=0.05

group1	group2	meandiff	p-adj	lower	upper	reject
Master	Non-master	-0.1799	0.3759	-0.5808	0.221	False

In [57]:

```
compute_tukey_hsd(df, 'gender', 'Q4')
```

Multiple Comparison of Means - Tukey HSD, FWER=0.05

group1	group2	meandiff	p-adj	lower	upper	reject
Female	Male	0.0345	0.8351	-0.293	0.362	False

In [58]:

```
compute_tukey_hsd(df, 'age_range', 'Q4')
```

Multiple Comparison of Means - Tukey HSD, FWER=0.05

group1	group2	meandiff	p-adj	lower	upper	reject
18-24	25-44	-0.0083	0.961	-0.3449	0.3283	False

In [59]:

```
compute_tukey_hsd(df, 'education', 'Q4')
```

Multiple Comparison of Means - Tukey HSD, FWER=0.05

group1	group2	meandiff	p-adj	lower	upper	reject
Master	Non-master	-0.1349	0.4162	-0.4625	0.1926	False