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Master Thesis

**Beyond the Label: Examining the
Effects of Sustainability Labels on
European Consumers' Purchasing
Behaviour, with a Focus on Food
Product Healthiness and Private Labels**

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ABSTRACT

The increasing attention to sustainability changes consumers' decisions. While previous research has established a clear relationship between sustainability labels and the intention to purchase sustainable food items, the current research goes further. This study investigates the effects of sustainability labels on European consumers' purchasing behaviour, focusing on food products with healthiness and private labels. Incorporating results from a quantitative survey with a choice experiment, this study demonstrates that when combined with a sustainability label, products with front-of-pack healthiness labels have the highest purchase intention compared to products with only a healthiness label or a sustainable label. Moreover, combining a sustainability label with a non-private label had higher positive results on purchase intention than a private label. These findings extend the existing literature that sustainability labels work differently depending on food product packages and characteristics. This study suggests several managerial implications for labelling strategies.

TABLE OF CONTENTS

1. INTRODUCTION	4
2. LITERATURE REVIEW	7
2.1. Food Labels	7
2.1.1. Food Labels' Overview	7
2.1.2. Sustainability Labels on Food Products	8
2.2. Healthy Food Products	9
2.2.1. Healthy Food Products Description	9
2.2.2. Front-of-Pack Nutrition Labels	9
2.2.3. Healthy Food Products with Sustainability Labels	12
2.3. Private Label Brands	13
2.3.1. Food Retailers' Private Brands	13
2.3.2. Private Brand Products with Sustainability Labels	14
2.4. Purchasing Intentions of Sustainability Labels	15
3. METHODOLOGY	16
3.1. Objectives and Aim of Study	16
3.2. Research Model	17
3.3. Research Design	18
3.3.1 Variables and Measures	18
3.3.2. Sampling Strategy	24
3.3.3. Survey Design.	25
3.4. Data Collection	27
3.5. Data Analysis	28
3.6. Ethical Considerations	29
4. RESULTS	30
4.1. Sample Overview	30
4.2. Descriptive Statistics	31
4.2.1. Descriptive Statistics of Study 1	31
4.2.1.1. General Descriptive Statistics of Study 1	31
4.2.1.2. Descriptive Statistics by Country of Study 1	32
4.2.1.3 Descriptive Statistics by Product of Study 1	34
4.2.2. Descriptive Statistics of Study 2	35
4.2.2.1. General Descriptive Statistics of Study 2	35
4.2.2.2. Descriptive Statistics by Country of Study 2	37

4.2.2.3 Descriptive Statistics by Product of Study 2	38
4.3. Regression Analysis	40
4.3.1. Regression Analysis of Study 1	40
4.3.2. Regression Analysis of Study 2	42
4.4. Analysis of Purchasing Behaviour	47
4.4.1. General Analysis of Purchasing Behaviour	47
4.4.2. Analysis of Purchasing Behaviour by Country	52
4.5. Summary of Results	56
5. CONCLUSIONS	58
6. LIMITATIONS AND RECOMMENDATIONS	59
7. MANAGERIAL IMPLICATIONS	60
REFERENCES	62
APPENDIX 1. Research Survey	71

1. INTRODUCTION

The ascent of sustainability in today's top discussions puts the topic at the heart of business decisions as consumers demand changes and evolve in their purchase decisions. There is a critical need to transition to more sustainable diets to reduce climate change, biodiversity loss, water pollution, unsustainable water usage and other negative effects of the existing food system on the environment (Willett et al., 2019). The food industry undergoes this change through the rise of sustainability labels which we can now see popping up on the products on the shelves. The labels aim to satisfy the demand for more information and transparency about products so consumers can make a more informed choice (Grunert et al., 2014). The global sustainable food market in 2021 accounted for USD 159.25 billion and is fast-growing as the growth rate is projected to be 6,6% by forecast 2028 (Environment Friendly and Sustainable Food Market Size, Share, Analysis & Industry Trends, n.d.). However, this present study will focus on countries in Europe as it would complement the lacking existing research in that geographic area, since the chosen countries (Norway, France, and Lithuania) are good representatives of the different regions of Europe.

A review of existing experimental studies of eco-labels conducted by Potter et al. (2021) showed that a majority of the studies that "tested the use of a variety of eco-labels reported a positive effect on the selection, purchase or consumption of more environmentally sustainable food and drink products" (p. 25). Therefore, while these studies have already shown a direct link between sustainability labelling and the intended purchase of sustainable food products, this current research goes deeper. It adds the two moderating factors of healthiness and private labels, investigating whether a sustainability-labelled product's nutritional value and type of brand could affect the established equation.

Moreover, previously investigated moderating variables were summarised in the paper by Majer et al. (2022) and categorised into three different clusters. The first category, individual factors of the consumers, includes awareness and concern about sustainability issues, understanding and trust in sustainability labels, time preference, attitude towards companies' CSR activities, information exposure, and sociodemographic factors. The second category, label characteristics, comprises the labelling scheme and organisation, valence, mass balance certification, and additional information surrounding the label. Lastly, the

third category, context factors in the purchase situation, contains product type, origin, season, and price. However, Majer et al. (2022) underline that the existing body of literature needs to include more research on sustainability labels' interaction with other cues such as health or type of brand. The latter moderators would fit into the third category developed by Majer.

Healthy eating has gained popularity over the last few years as it is now a top priority for half of the consumers, according to a recent McKinsey research (Grimmelt et al., 2022). Healthy eating can be reflected in consumer behaviour when shopping for food products. In the use of food labelling, the FDA defines a healthy product as one that “contains a certain meaningful amount of food from at least one of the food groups or subgroups (e.g., fruit, vegetable, dairy products, etc.) recommended by the Dietary Guidelines” (Center for Food Safety and Applied Nutrition, 2022).

Furthermore, as consumer behaviour trends evolve rapidly, the Food market has seen the rise of private label brands, with a growth of 16% over the last two years (NielsenIQ, 2022). The competitive advantage gained by the brands can explain the increase in new private-label brands (Górska-Warsewicz et al., 2018). Because the retailers delegate the production to a third party and sell the products under their brand name, “private labels or store brands are an important source of profits for retailers and a formidable source of competition for national brand manufacturers” (Hoch & Banerji, 1993, p. 1).

As the efficacy of sustainability labels is being discussed due to the lack of awareness (Annunziata et al., 2019) and the multiplication of their use, this paper addresses whether different European sustainability labels should still be used in the case of products considered healthy and for private labels and see whether marketers could benefit from them.

Are sustainability labels helping consumers make more educated choices for the environment and social aspects, or is it just a marketing strategy that needs to be clarified even for the consumer? Is it worth it for private labels to have sustainability labelling on their products to boost sales? Overall, do customers choose more private-label products or healthy goods when they are displayed with sustainability labels? It would be particularly relevant for marketers and businesses to answer these questions, investigating which label combinations would have more impact. Therefore, it would show if it is worth investing time and money into obtaining a sustainability label if no additional sales or

deficiencies occur. Most existing research stays at the superficial level of investigation without questioning whether different factors could be added to the equation, therefore complexifying the reasoning. Reviewing the existing and extensive literature is helpful when looking at food labelling, healthy products, private labels and sustainability. The main question of this research is whether moderating factors (healthiness and private labels) on various sustainability-labelled products increase European consumers' choices and purchase intention of those products. Answers will be sought in the previous research and through a quantitative survey with pair choices experiment.

2. LITERATURE REVIEW

2.1. Food Labels

2.1.1. Food Labels' Overview

Consumer behaviour has changed significantly due to the Covid-19 pandemic, according to a McKinsey study (Briedis et al., 2020). The crisis intensified the shift from in-store experience to digital shopping, decreasing the direct interaction between buyers and sellers in the food market. In that context, labels have flourished and constitute a way for consumers to learn more about the food they are considering purchasing (Wandel, 1997). Caswell and Padberg (1992) point out that “food labels play important third-party roles in the food marketing system through their impact on product design, advertising, consumer confidence in food quality, and consumer education on diet and health” (p. 1). Many studies show that a majority of consumers read and examine the food labels before making a purchase decision, based on whether the food products are suitable for vegetarians and religious matters, safe against food-related diseases, and organic or not (Wandel, 1997; Bandara et al., 2016; Kumar & Kapoor, 2017). Therefore, when influencing consumers’ food purchasing habits through food labels, it is critical to understand how customers read these food labels (Hartmann et al., 2018). Research reveals that redesigning the front and back of package food labels would help better comprehend the information on the labels as the design would be more straightforward and uncomplicated (Temple & Fraser, 2014). However, it is worth noting that using labels as a point-of-purchase shopping aid is “limited by consumers’ information processing abilities and time” (Caswell & Padberg, 1992, p. 1).

Many types of food labels exist, but referring to the views of Gracia and de-Magistris (2016), consumers mainly value “labelling schemes that are regulated by EU law” (p. 1). One research highlights that labels directly impact consumers’ perceptions towards the products and their health consciousness (Hwang et al., 2016). Regarding carbon-labelled products, perceived benefits impact consumers’ intentions to purchase (Zhao et al., 2018). Similarly, region-of-origin labelling impacts consumers’ purchasing intentions when consumers identify with the region and it seems authentic (Lorenz et al., 2015).

Additionally, nutrition labels influence the healthiness perception and intent to buy food products (Huang & Lu, 2015). Ducrot et al. (2016) add that nutrition labels are “effective in promoting overall healthier food choices in all population subgroups” (p. 1). However, among all helpful food labels, the main focus in this study is on sustainability labels.

2.1.2. Sustainability Labels on Food Products

Sustainability labels or eco-labels have recently proliferated in the food industry (Asioli et al., 2020). These labels constitute essential resources that aid consumers in evaluating food sustainability (Van Loo et al., 2015). They aim to educate consumers about the impact of food products on the food supply chain, regulate market failures and encourage the consumption of more sustainable food (Asioli et al., 2020). Indeed, eco-labels are associated with a significant increase in consumer choice and purchase of sustainable food products (Potter et al., 2021; Duckworth et al., 2022). Dangi, Gupta & Narula (2020) explain that the food trust increase associated with the labels reduces the information asymmetry in consumers. Furthermore, Bastounis et al. (2021) found that eco-labels could make consumers more inclined to pay more for ecologically friendly items and could be used to promote the switch to more sustainable eating habits. A review of existing research shows that consumer knowledge of eco-labels positively correlates with the purchase intention of eco-labelled products (Lee et al., 2020). Indeed, “eco-label knowledge is positively associated with attitudes towards the environment, and positive environmental attitudes and trust in eco-labels affect pro-environmental consumer behaviour” (Taufique et al., 2017, p. 1).

The literature identifies a clear need for practical information policies from firms, policy-makers and accreditation organisations to educate consumers so their awareness and knowledge of labels increase. Consequently, this would also increase their purchase intentions of eco-labelled products, therefore moderating the previous findings (Aprile & Punzo, 2022). Promoting sustainable consumer behaviour will also accompany showcasing the favourable effects on the environment associated with sustainability labels (Siraj et al., 2022). However, Annunziata, Mariani, & Vecchio (2019) outline that the level of visibility and degree of understanding of sustainability labels is low and call again for “effective information policies to increase familiarity among specific market segments” (p.

1). Moreover, Grunert, Hieke & Wills (2014) add that the extent to which customers' broad concern about sustainability may be translated into actual behaviour will be determined by how often these labels will be used in the future.

2.2. Healthy Food Products

2.2.1. Healthy Food Products Description

Healthy food is a complex topic with different interpretations among professionals, dietists and academics (Rodman et al., 2014). The English dictionary (n.d.) defines health food as "any natural food popularly believed to promote or sustain good health, as by containing vital nutrients, being grown without pesticides, or having a low sodium or fat content". One paper analysed factors influencing the perceived healthiness of food and concluded that there are six categories affecting consumers in their understanding of healthy food products: the communicated information on the package, the product category, the shape and colour of the product packaging, the product ingredients, the organic origin of the product and the taste with other sensory features of the product (Plasek et al., 2020). In addition, Clark et al. (2019) researched multiple health and environmental impacts of foods. They discovered that foods with positive health effects frequently have less impact on the environment and are more sustainable. Another research highlighted that for a certain number of consumers, the organic origin of food is an essential factor in the comprehension of healthy food (Rodman et al., 2014). One of the objectives of this study is to determine whether sustainability labels, when presented with healthy nutrition labels, are effective at encouraging sustainable purchasing behaviour. In this research, it is important to note that informative healthiness front-of-pack nutrition labels on the package will define healthy food.

2.2.2. Front-of-Pack Nutrition Labels

Front-of-pack nutrition labels (FoPLs) have been highlighted as promising methods for improving population eating habits, thereby aiding in preventing obesity and noncommunicable illnesses (World Health Organization, 2004). As claimed by Van Herpen & Van Trijp (2011), FoPLs are based on a limited number

of key nutrients (usually salt, sugar, saturated fat and total fat) in which consumers show the most interest and of which have been well-documented to have potentially harmful impacts on human's health. FoPLs assist customers in interpreting the nutritional quality of food items by giving simplified nutritional information (Hawley et al., 2013). Moreover, through product innovation and manufacturer changes, FoPLs can improve the nutritional value of the food supply (Ni Mhurchu et al., 2017). Likewise, FoPLs are a great tool to determine a product's healthiness as a signpost logo can indicate a product's healthiness without exposing the underlying nutritional content. Indeed, nutrition tables present nutritional data in detail but with no conclusive information about a product's healthiness overall (Van Herpen & Van Trijp, 2011).



Picture 1. Map of the European Union's front-of-pack nutrition labels
 (Resource: Peonides et al., 2022)

Multiple voluntary FoPL programs have been established globally in recent decades; some have had official governmental support, while others were launched as social responsibility projects by food producers or non-governmental organisations (Codex Alimentarius Commission, n.d.). Three different types of labels recommended by member states can be identified in the European Union.

The first kind includes endorsement labels, which imply that the product is healthier than other items in the same category. The second form is summary-graded labels, which provide an overall rating for the product. The third type, nutrient-specific labels, provide non-interpretive information on the number of certain nutrients, with the proportion of reference consumption determined per daily adult nutritional requirements (Jewell, 2019). *Picture 1* above shows an overview of the front-of-pack nutrition labels used in the EU. Only the Green Keyhole and Nutri-Score labels will be investigated in the remainder of this paper. The European Consumer Organization (2019) asserts the following benefits from these two FoPL: they are extensively used in EU nations, are simple to comprehend and identify, and are supported by the government.

Nordic countries (Denmark, Iceland, Norway and Sweden) and Lithuania use the optimal Keyhole label for food products. The label makes it easy for everyone to make better health choices while grocery shopping, regardless of age, background, or language (The Norwegian Directorate of Health, 2019). This tool aims to empower individuals to adopt a healthy diet through government dietary recommendations and promote the production of healthy products by the food industry (Nordic Co-Operation, 2021). According to The Norwegian Directorate of Health (2017), a demographic study of keyhole awareness and knowledge among consumers over the age of 18 conducted in January 2012 revealed ongoing favourable progress: 98% were familiar with or had heard of the logo; 85% recognized the logo signified a better choice; many knew the logo indicated less fat, sugar, and salt and more dietary fibre; 60% trusted the scheme; and 50% said it made it simpler to pick healthier items.

The Nutri-Score system is used voluntarily in several European Union countries, including Belgium, France, Germany, Luxembourg, Switzerland, Spain and the Netherlands (Food Navigator, 2021). The Nutri-Score measures the degree of potential health benefits a food product offers by considering its nutrients. It has five colours, each of which corresponds to a different letter. The letter 'A' denotes foods with the highest nutritional content and is linked to the colour dark green. Dark orange has been applied to 'E', representing the lowest value (Egnell et al., 2020). In the research from De Temmerman et al. (2021), the Nutri-Score labels allowed respondents to evaluate the healthiness of products more accurately. In addition, it can potentially increase sales of healthy products without decreasing sales of unhealthy products.

However, according to one meta-analysis by An et al. (2021), findings on the effectiveness of FoP nutrition labels in ‘nudging’ consumers towards healthier food purchases remain mixed and inconclusive. The authors suggest that future research should look at other FoPL types besides traffic light labels and analyse the possible effects of customer affordability, demographic subgroup, and shopping environment.

2.2.3. Healthy Food Products with Sustainability Labels

Consumers can be guided in making healthier and more environmentally friendly decisions by eco-labels and nutrition labels on the front of the packaging. Although the environmental and health effects of a product do not always coincide (i.e., healthier foods do not always have a lower environmental impact than less healthy or processed foods, and vice versa), research indicates that healthier foods typically have a higher sustainability rating (Potter et al., 2023). Conversely, there needs to be more data on eco-labels effectiveness in the context of nutrition labels. Labelling might only partially advance the adoption of sustainable and healthy food alternatives (Hoek et al., 2017). The positive impact of labelling should increase when the healthy food alternatives are more similar to standard products. Following De Temmerman et al. (2021) research, perceived nutritional benefits mediate the association between healthiness front-of-package label categories and purchase intention. However, how a sustainability label controls the relationship between separate healthiness nutrition labels and purchase intention has yet to be thoroughly investigated. Moreover, “while there have been numerous public and private initiatives focused on communicating food sustainability-related information to consumers, there is a need to examine how consumers are using these labels concerning other food values of importance to them” (Asioli et al., 2020, p.171). Indeed, sustainability-related labels compete with customers’ attention with other labels (e.g. healthiness labels), and a combination of one or several labels on an identical product might have different impacts. According to Plasek et al. (2021), further studies should seek to determine how much information a manufacturer should provide on packaging to convey a relevant influence on health to the consumer. Considering this remark, it is crucial to investigate whether using different healthiness and sustainability

labels together increases the willingness to buy. Therefore, this study hypothesises that:

H1: A combination of sustainability and healthiness labels has a greater choice selection and purchase intention than only sustainably labelled food products without a healthiness label.

2.3. Private Label Brands

2.3.1. Food Retailers' Private Brands

According to Fitzell (1982), a private brand product or private label is a labelled product owned and packaged by the retailer. Marketing managers and academic researchers' interest considerably increased in private labels. For retail managers, the growth of private label brands presents an opportunity to understand better the reasons and stimulus leading to choosing private label goods (Abhishek, 2011). Retailers also typically handle the complete range of responsibilities for their private label products, as opposed to national brands (Wu et al., 2021). Moreover, retailers can position the private-label brand to imitate the top national brands, and store brands frequently copy national brand packaging in multiple ways (Morton & Zettelmeyer, 2000).

Private labels appeared on the market 70 years ago. Since now, "brands have evolved from generic, inexpensive, low-quality budget private labels to lower-priced-than-national brands but acceptable-quality value or standard private labels" (Gielens et al., 2021, p.1). Consumers' purchasing decisions for private label products are complex since each product category has individual attributes, and buyers generally have diverse impressions of various products, which can significantly impact elements connected to purchasing behaviour (Livesey & Lennon, 1978; Veloutsou et al., 2004). Thus, Sansone et al. (2020) show in their paper that groupings of heterogeneous variables related to consumers' perceptions of products, post-consumer satisfaction, the role of stores, and the trust that retailers have earned over time influence customers' decisions about private-label food items. Following Gielens et al. 2021 study, private label brands should adopt and improve new strategies as the new marketplace evolves and consumers look after not only price and quality.

2.3.2 Private Brand Products with Sustainability Labels

Lately, retailers have developed and started to offer an organic or more environmentally friendly private label assortment. Such tactics enable retailers to better adapt to consumer needs and catch their attention at the point of sale (Jiménez-Guerrero et al., 2015). Furthermore, sustainable private labels bring value to consumers because goods are environmentally or socially sustainable (Kumar & Christodouloupoulou, 2014). In today's marketplace and more than for earlier generations, current consumers care not only about quality and cost but also about sustainability, ethics, social responsibility, and image (Gielens et al., 2021). Focusing on the sustainability of products can provide manufacturers with a competitive advantage, regardless of whether it is a manufacturer brand or a private label (De Temmerman et al., 2021). Masuda and Kushiro (2018) found that the psychology of customers who seek value-added products with safety attributes leads to the conclusion that brand loyalty elements impact the willingness to pay (WTP) premium the most. Another study discovered that the euro-leaf emblem could ensure product safety, quality, and environmental respect while having the same beneficial effect on purchasing intentions for both branded and private-label items (Morrone & Schena, 2018). Compared to a local and global brand, a certified organic private brand is seen as almost similarly hedonic, ecologically friendly, and safe, with an equal price premium and buying intention (Bauer et al., 2013). Ropars-Collet and Bougherara (2013) find that "promotion for organic products has a positive impact on private-labelled organic product demand while promotion for fair trade products has a positive impact on national brand fair trade items." The literature shows uncertainty regarding the connection between sustainability labelling and private or national brands. Moreover, previous research investigated only one market with one type of organic label. There is no clear evidence of the purchase intention on private label brands versus non-private brands' food products, together with sustainability labels across European countries. Therefore, this study hypothesises that:

H2: A combination of sustainability and private labels has a greater choice selection and purchase intention than only no sustainably labelled private and non-private food products.

2.4. Purchasing Intentions of Sustainability Labels

Purchase intention and willingness to buy are critical approaches in the marketing field. Consumers' purchase behaviour is predicted and measured with purchase intentions alongside other attitude measures (Axelrod, 1968). Purchase intention questions are used in many surveys for research about food products or frequently purchased packaged goods (Morrison, 1979). In their research, Bauer et al. (2013) put forward four primary purchase motivations for organic food: healthiness, hedonism, environmental friendliness, and food safety warranty. The most substantial influence on customers' purchase intentions is the variables such as product quality, brand name, and advertising, while packaging and price have no significant impact (Mirabi et al., 2015). However, Lee et al. (2020) demonstrate that "consumers' purchase intention is highest when the sustainable label and traceability information is provided simultaneously" (p. 1). Moreover, when customers are aware of the quality and sustainability labels, their sensory rating and purchase intent increase (de Andrade Silva et al., 2017).

Past studies have looked closely at consumers' WTP premium prices for goods bearing organic or sustainable labels. The WTP a different additional price for eco-labelled products was revealed by most consumers (Moon et al., 2002). Each analysis states a different WTP for organic products that approximately varies from 10 to 30% premium of price, and factors such as location, product category, market segments, and socio-demographic factors can impact WTP (Van Loo et al., 2011). Ureña et al. (2008) research shows that women's attitudes to purchasing and consumption of organic food are higher compared to men, while men are encouraged to spend more on organic food than women. Nevertheless, environmentally sustainable products with organic labels have more positive WTP than other labels; in such a manner, eco-labels could be helpful to complement and encourage sustainable diet promotion strategies (Bastounis et al., 2021). Thus, consumers are willing to pay more for socially responsible products, according to studies undertaken in the United States, China, Japan, and India (Paul & Rana, 2012). Nonetheless, as suggested in the literature, there is immense potential in cross-country studies across Europe to research WTP for food products with sustainability labels combined with FoPLs and private brands. In this following study, purchase intention is synonymously equated with product choice.

3. METHODOLOGY

3.1. Objectives and Aim of Study

The research aims to provide insights into consumers' value of food sustainability labels based on the hypothesis that they impact consumers' intent to purchase (food product choices). Therefore, the study examines the influence of moderating factors (products with front-of-package healthiness labels and private label products) on various sustainability-labelled products' purchase intention from European consumers.

Based on the literature review and other researchers' recommendations, the hypotheses proposed in this study are summarised as follows:

H1: A combination of sustainability and healthiness labels has a greater choice selection and purchase intention than only sustainably labelled food products without a healthiness label.

H2: A combination of sustainability and private labels has a greater choice selection and purchase intention than no sustainably labelled private or non-private food products.

In this study, no predictions are made for an additive effect of healthiness and private labels on the sustainability label effect.

The main research objectives are described below:

- 1) To analyse academic literature on sustainability food labels and their purchase impact with FoPLs and private brands, understanding of healthy/unhealthy product consumption, private label consumption, and correlation between these constructs.
- 2) Based on the analysis of scientific literature, construct the research model and develop the research methodology.
- 3) To collect data using a quantitative online survey. Statistically analyse data and test hypotheses.

4) To conduct the research and to provide the results, recommendations, and practical implementations for future research.

3.2. Research Model

The theoretical framework studied laid the foundation for the conceptual research model (*Figure 1*):

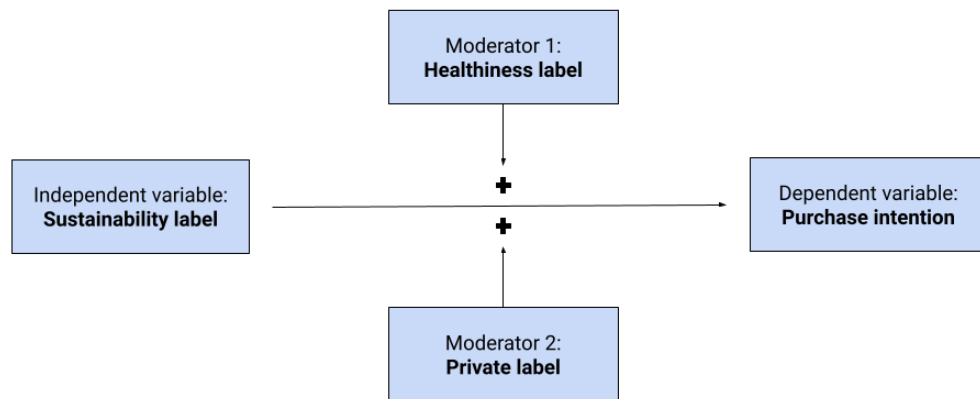


Figure 1. Research Model of the Study

The main proposition in the blueprint indicates that the sustainability label acts as an independent variable that positively impacts the dependent variable of the purchase intention to buy a product. There is no prediction about the interaction between healthiness and private labels because the moderators are fundamentally different, and it would be too far-fetched to foresee an interaction.

Therefore, this research includes two studies, one for each moderator. Each study contains four variations and six combinations of paired variations, illustrated with four food products.

The healthiness label on food products is the first moderator in the model. Pursuing a healthy lifestyle is becoming increasingly popular, and numerous organisations and initiatives promote and support healthy living (Obidovna & Sulaymonovich, 2022). Healthy food consumption is usually associated with products' sustainable and organic origin of products. People who purchase healthier and more nutritious food options might be even more willing to buy these healthy products if they have a sustainability label.

A private-label brand is the second moderator in the chain. During economic hard times, progressively, buyers prioritise great value with lower cost over name recognition by choosing private label brands (Jaafar et al., 2012; Sinha

& Batra, 1999). Moreover, private premium labels refocus on sustainability, ethics, and other social cooperative initiatives. Such traits alter the level of approach and perceptions toward the dependent variable. Private-label brands with sustainability labels might be able to increase customers' purchase intentions.

3.3. Research Design

This study conducts a cross-sectional online survey to evaluate how sustainability labels affect consumer behaviour in Europe while considering the moderating aspects of product healthiness and private brands. An online survey design is appropriate for this research as it allows a cost- and time-efficient collection of quantitative data from a large sample of participants from all the countries under study (Wright, 2005). The survey replicates real-life choices using a discrete choice experiment to simulate an actual purchasing situation. Further, the acquired primary data will be analysed using a regression analysis. It allows us to compute data, deduct to what extent consumers value the different features, and therefore identify their preferences on products with or without sustainability labels together with or without private and healthiness labels.

3.3.1. Variables and Measures

A sustainability label on a food product is the independent variable for this study, as measured by participants' awareness and use of sustainability labels on food products. An imitation label was made to avoid issues of awareness of specific sustainability labels that already exist (*Picture 3*). The imitation label design was created based on the characteristics of real eco-labels (green color, leaf symbol). This label was used for both study (1 and 2) experiments.



Picture 3. Design of Sustainability Label

The dependent variable for this study is purchase intention, measured by the frequency of food product choices and preferences leading to potential future purchases.

Participants' awareness of different labels was measured using a Likert scale ranging from 1 (not familiar) to 5 (strongly familiar), with the question "How familiar are you with sustainability/healthiness/private labels?"

Participants' purchase of food products with different labels was measured using a Likert scale ranging from 1 (extremely unlikely) to 5 (extremely likely), with the questions "How likely are you to purchase food products with sustainability/ healthiness/private labels?" and "What kind of food products do you usually buy with the following labels: sustainability/healthiness/private labels?" across a selection of eight product groups (Fruits & Vegetables; Grains, Cereals & Bakery; Dairy products; Sweets & Snacks; Protein products; Drinks & Hot beverages; Condiments, Oils & Spices; Other).

Participants' perceptions of different food product labels were measured using a Likert scale ranging from 1 (not important) to 5 (very important), with the question "How important are the following labels when deciding which food products to purchase: sustainability/healthiness/private labels?"

Participants' attitude about labels on food products was measured using a set of 9 statements, using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). For example, "Sustainability labels are more relevant for branded food products than for private-label products." and "Healthy food products are more likely to have sustainability labels compared to unhealthy products."

Healthiness labels are the first moderator variable that was examined in Study 1. Two real FoPLs represented already implemented healthiness labels in each country: the Green Keyhole in Lithuania and Norway, and the Nutri-Score in France (*Picture 4*).



Picture 4. FoPLs used in Study 1

To reduce biases linked to other elements displayed on regular food packages, this experiment only contained food product pictures without brand names (*Picture 5*). Only generic terms were used to highlight the products' prominent features. To depict healthier options, products that generally have a FoPL on their package were chosen and were considered healthier because of lower amounts of salt, sugar, saturated fat, or higher amount of fibre. For less healthy options, regular products were used. The composition of dark chocolate (lower in sugar) is healthier than the composition of milk chocolate; light cheese contains fewer calories and less cholesterol or sodium than regular cheese; the natural tomato sauce contains fewer calories because of less added sugar compared to regular tomato sauce; multigrain bread is a more nutritious, as it contains more fibres, than white bread.



Picture 5. Food Products Used in Study 1

To test Hypothesis 1 in Study 1, variations were generated by pairing the two different variables (healthiness label/no healthiness label) and (sustainability label/no sustainability label) together, and there were in total four variations of a product in the model (*Figure 2*). The FoPL was displayed only on the healthier products (Variation 1 and Variation 2). The regular food products were used in Variation 3 and Variation 4. The variation with no label was used as a control variation, and presenting the label alone or in combination was essential for measuring effectiveness in the model of Study 1 (Potter et al., 2023).

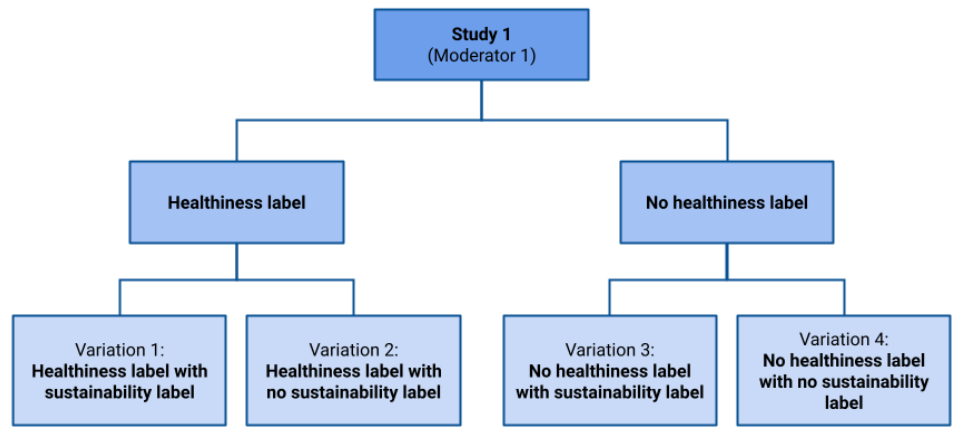


Figure 2. Model of Study 1

Each variation was paired with another one to get six combinations that were used in the survey (Picture 6).

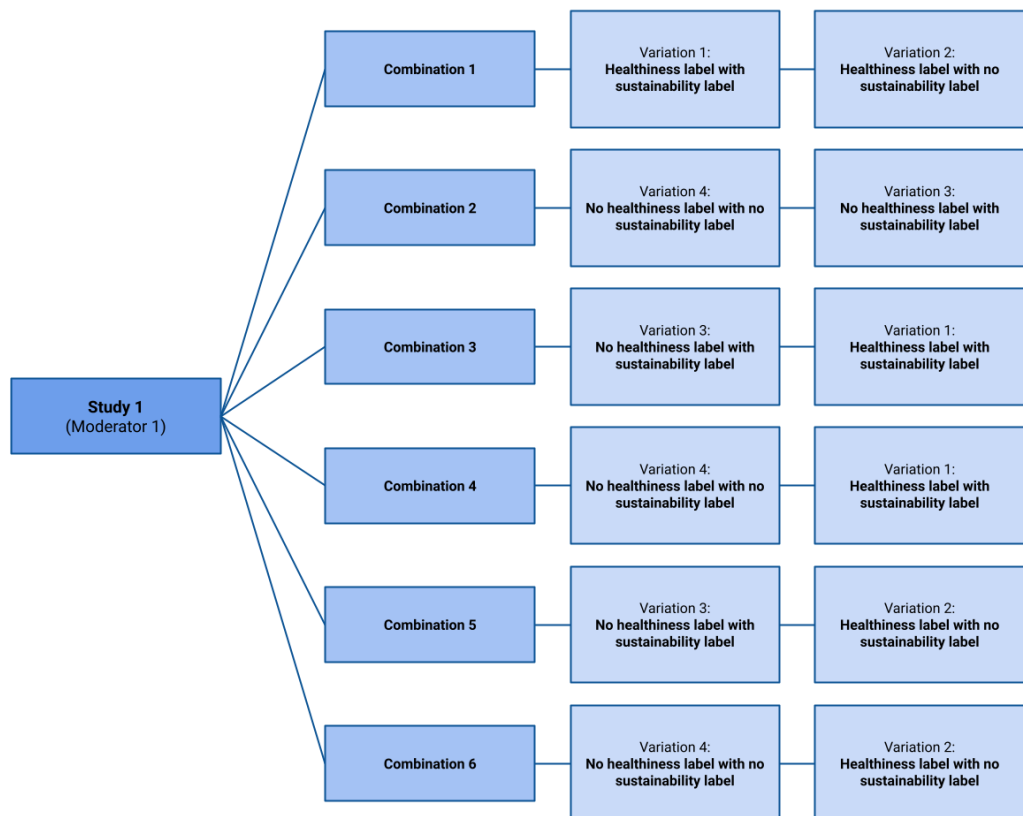
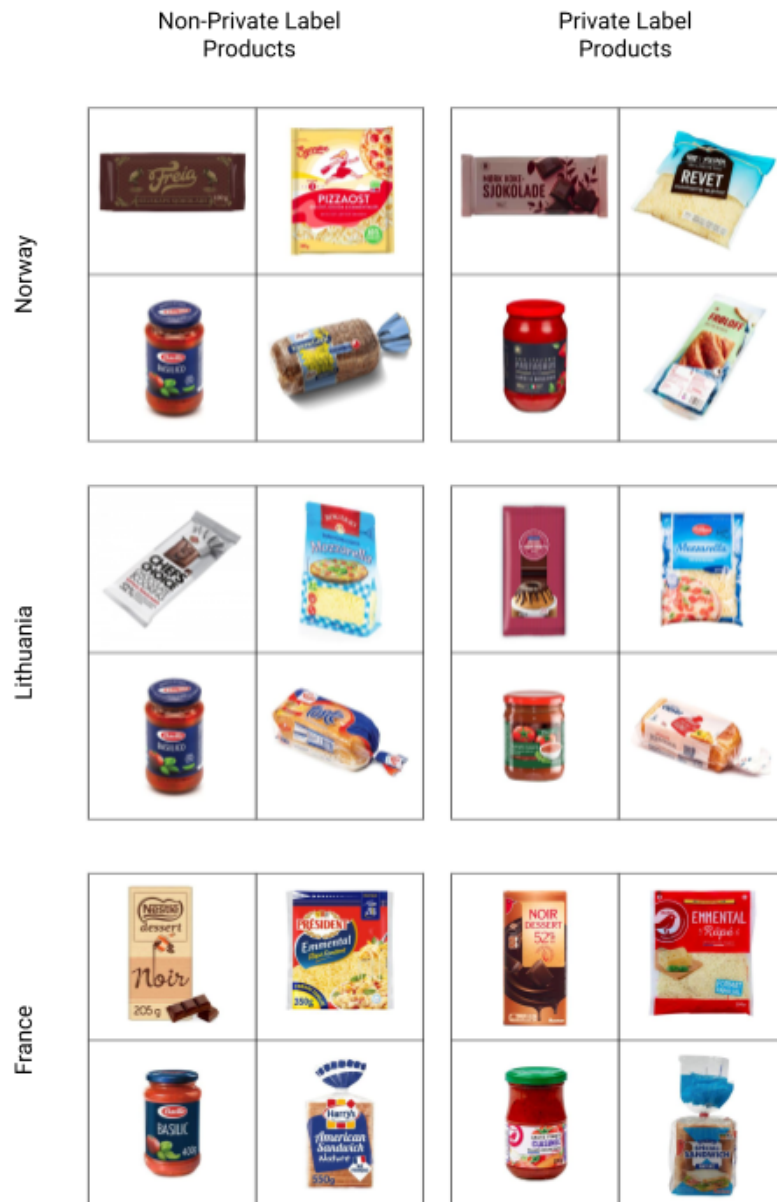


Figure 3. Combinations of Study 1

Private labels are the second moderator variable examined in Study 2. Typical and popular private-label food products and branded (not private-label) food products (Figure 3) were selected for each country.



Picture 7. Non-Private and Private Label Products Used in Study 2

To verify Hypothesis 2 in Study 2, variations were generated by pairing the two different variables (private label/non-private label) and (sustainability label/no sustainability label) together, and there were in total four variations of a product in the model (Figure 4). Non-private label variation without a sustainability label was used as a control variation, and presenting the label alone or in combination was important for measuring effectiveness in the model of Study 2 (Potter et al., 2023).

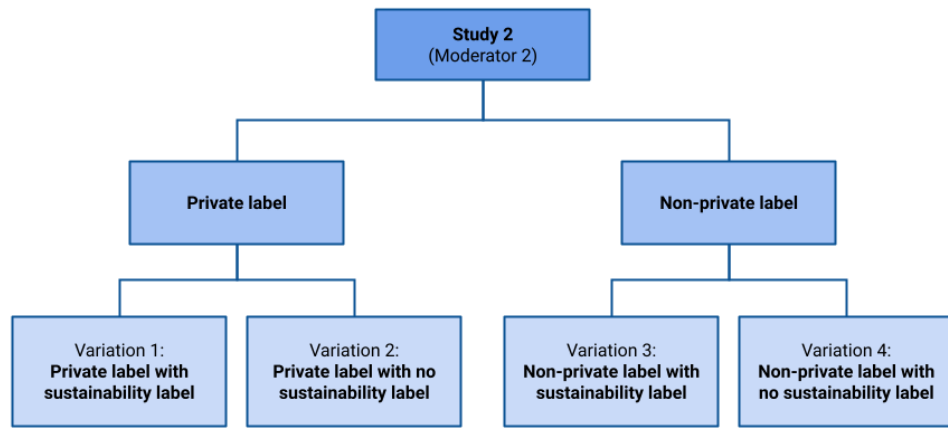


Figure 4. Model of Study 2

As mentioned before, Study 2 has four variations that were each paired with another one to get six combinations, used in the survey (Figure 5).

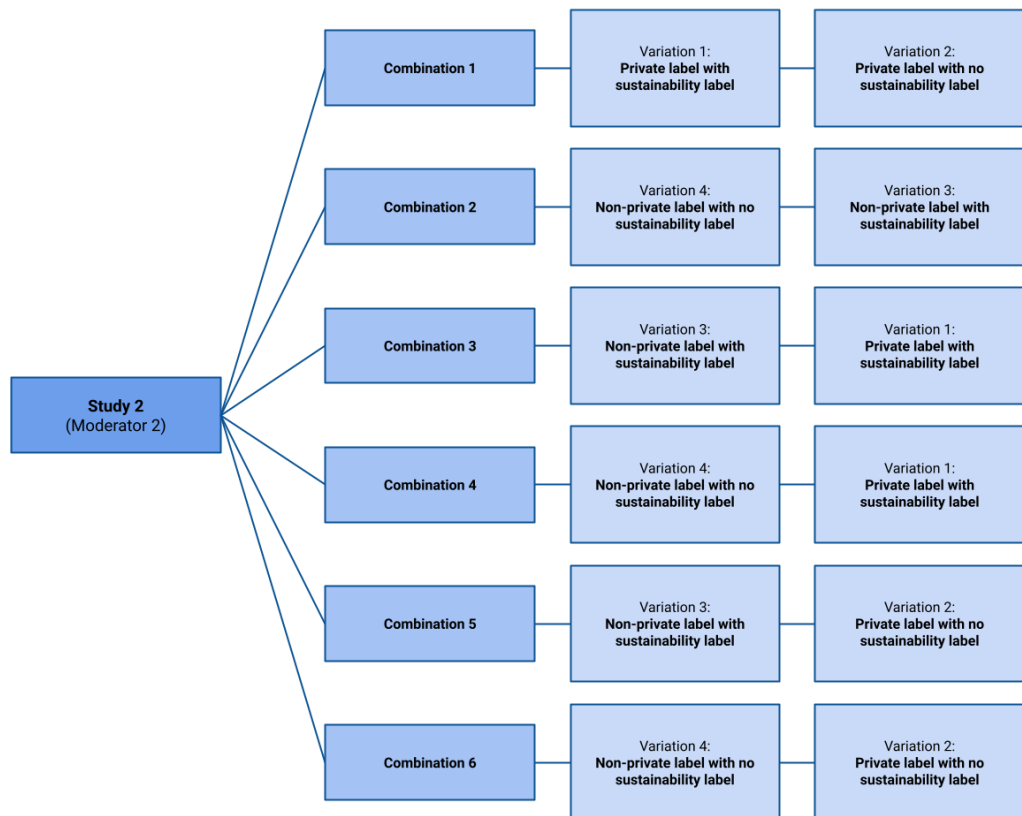


Figure 5. Combinations of Study 2

Four food products were chosen to illustrate each variation and reduce the noise of individual preferences (bread, grated cheese, chocolate, and tomato sauce). These food items belong to four different food groups: bread, dairy, sweets, and sauces. These categories were selected because they offer products reflecting a range of environmental and health implications. Some images of these food products were used as visual material. The names of products without a

brand, sustainability label, and the typical FoPL labels for each country supplemented the pictures for Study 1. Individual pictures for Study 2 were obtained from the websites of popular local supermarkets and supplemented with sustainability labels to make them suitable for the study. No additional information or quality indicators (e.g., nutrition information or price) appeared on the packages for all images to reduce the effect of other elements on participants' perceptions and decisions, as similar stimuli were used in other studies (Duckworth et al., 2022; Egnell et al., 2020).

Other control variables included in the analysis were demographic factors (country of residence, age, gender, education level and employment status). As explained previously, the most crucial control variable was the country of residence.

3.3.2. Sampling Strategy

The sample size was determined by using an online sample size calculator available at <https://www.calculator.net/sample-size-calculator.html>. It helped calculate the minimum sample size required for the study to achieve sufficient statistical power based on the confidence level (95%), the margin of error (5%), population proportion (90%) and population size (76,2 million). The results of the calculations propose that data should be collected from at least 139 participants to ensure a sufficient sample size for the planned data analysis.

The sampling confidence level of 95% and margin of error of 5% were selected as standard parameters. The population proportion was chosen as 90% because the survey was sent purposefully to people who meet the main criteria - France, Lithuania or Norway residents. It is confirmed by the survey's final results, where 371 responses were collected, and 22 (6%) of them selected their living place as "Other". The population size of the survey is 76,2 million people, as the sum of the targeted population is 68 million in France, 2,8 million in Lithuania, and 5,4 million in Norway (*World Bank Open Data*, n.d.).

	Power	N	Standard deviation	Effect size	Significance
Two-sided test for Mean	1.000	241	0.5	2.000	0.05

Table 1. Power Analysis Table of the Sample Size

For our collected clean sample size of the final 241 respondents, the statistical power is estimated to be 100% to show that means differ from 1 with a standard deviation of 0.5 (*Table 1*).

3.3.3. Survey Design

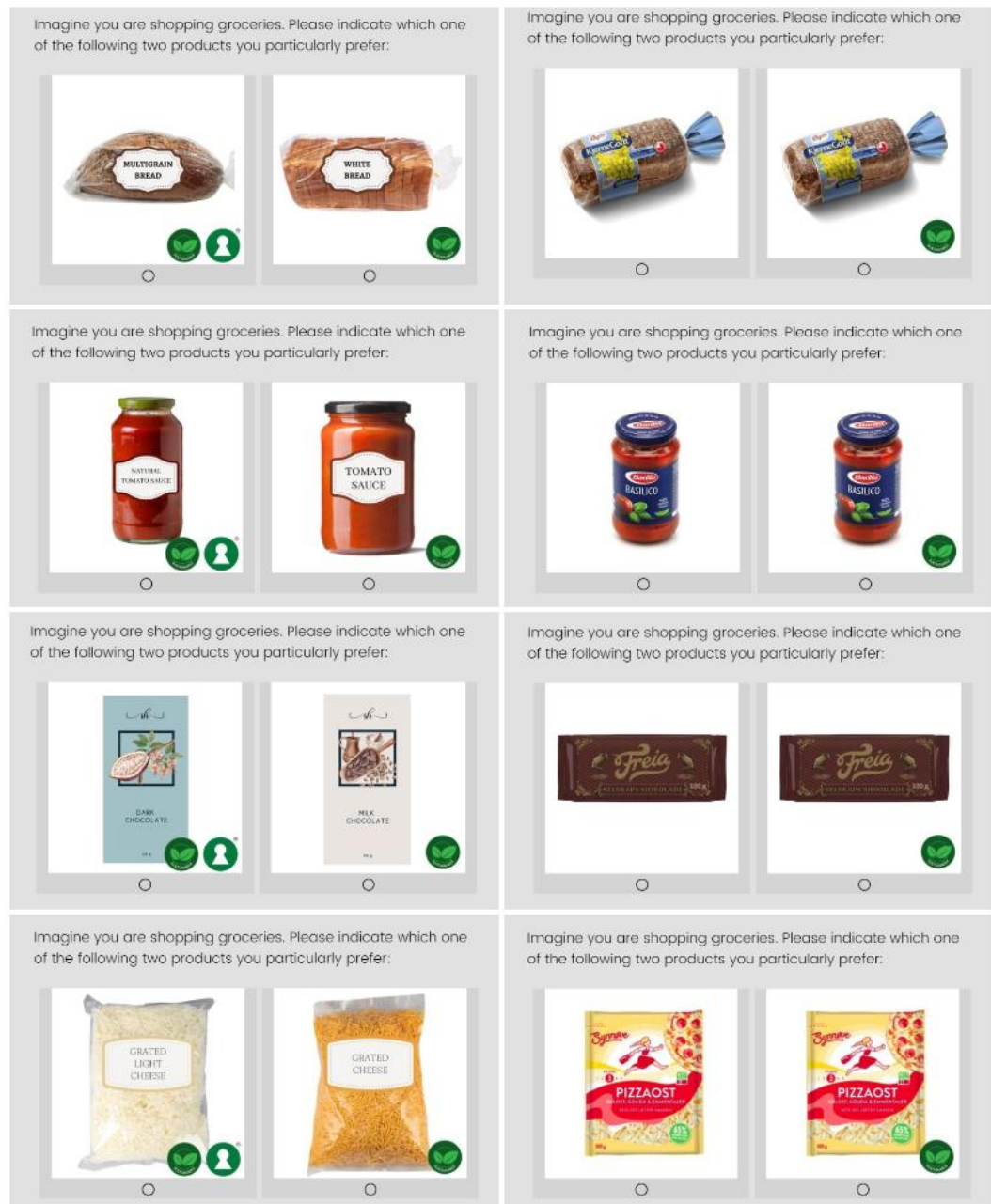
The online survey questionnaire for this study was designed to gather information on consumer purchasing behaviour related to food products with sustainability labelling, and moderating factors, including product healthiness and private brands (*Appendix 1*). The software Qualtrics was used to create and share the survey as it is one of the best and approved tools on the market, with advanced surveying features, ease of use and design. Moreover, to comply with legal and ethical regulations, Qualtrics allows a safe and trusted experience, especially for respondents' data protection and privacy. The survey is divided into three main sections: (1) demographic information, (2) discrete choice experiment, and (3) purchasing behaviour. The questionnaire was constructed based on prior research to guarantee the reliability and validity of the data acquired (Duckworth et al., 2022; Egnell et al., 2020; Kühne et al., 2022).

Section 1: Demographic Information. This section collects basic demographic information from participants, including questions on their country of residence, gender, age, work status, and educational level. This section was displayed at the beginning of the survey because it had been designed in previous studies (Duckworth et al., 2022; Egnell et al., 2020). It is necessary to collect demographic information to describe the sample of respondents in this study and check for distinctions among them (Connelly, 2013). Additionally, including demographic questions in surveys can help gather demographic data on existing and potential customers at scale. Later this data can assist in creating market segmentation strategies and targeting the appropriate customers.

Section 2: Discrete Choice Experiment (DCE). This section examines how people choose food products based on sustainability, healthiness, and private brand labels. The DCE is a benefit-based attribute survey method that provides respondents with samples of hypothetical scenarios (choice sets) preliminarily selected from all potential choice sets following statistical design principles (Ryan et al., 2008). It also helps assess participants' perceptions and awareness of food

labels when making purchasing decisions. Therefore, the DCE analysis was used in order to accomplish the research goal.

Participants were asked to imagine they were grocery shopping as an introduction to the task, as it was used in similar research (Kühne et al., 2022). During this process, respondents were shown randomised choice sets containing one combination of two product variations, each from which they may select one, imitating a circumstance similar to an actual and real-life market choice situation. Each participant randomly saw one combination from Study 1 and another combination from Study 2. *Picture 2* presents an example.



Picture 2. Example of the Choice Section for One Respondent from Norway

There were a total of 12 combinations, of which six were from Study 1, and six were from Study 2. The combinations were evenly randomised, so in the end, each combination was seen and tested by the same number of respondents. In short, Study 1 and Study 2 were parallel-design randomised controlled trials to test labels' preferences (sustainability label & healthiness label; sustainability label & private label) presenting combinations of different labels' variations.

Section 3: Purchasing Behavior. This section examines participants' food purchasing behaviour, including the familiarity and purchasing likelihood of food products with different labels, the type of food products purchased with these labels, and the importance of labels for their food purchasing decisions. The section also includes questions on participants' awareness and opinions about statements related to labels on food products. All questions in this section were closed, measured with the 5-point Likert scale (Likert, 1932), and designed based on previous studies (Azizi & Javidani, 2010; Vecchio & Annunziata, 2015). At the beginning of the section, definitions of label terms (sustainability label, healthiness label, private label) were given to ensure that all respondents had the necessary information to answer the questions (*Appendix 1*).

The survey length was kept to a bare minimum (5-7 minutes) to achieve high response rates and reduce difficulty for participants.

The questionnaire for this study was translated into four languages - Lithuanian, Norwegian, English, and French. The translations were necessary as the study aims to investigate the effect of sustainability labels on purchasing behaviour in Europe, where multiple languages are spoken. Additionally, it ensures that participants fully understand the survey questions and provide accurate responses in their native language, lowering the possibility of translation errors or misunderstandings (Brislin, 1970).

Overall, the study's design ensures that the data acquired appropriately address the research objectives while minimising potential biases' impact.

3.4. Data Collection

The survey was distributed through personal connections across various online platforms such as Facebook, Instagram, WhatsApp, and email. The mandatory criteria for the study was that participants must reside in one of three researched countries. The survey ran from April 10th until April 30th to get a

maximum of responses, and a total of 371 responses were recorded. The data was cleaned by removing unfinished answers and responses from people living in countries other than the targeted ones. With cleaned data, the final number of respondents was 241. Therefore, the aim to reach a necessary sample size of 218 respondents was attained. However, because of the cleaning, the number of combinations seen per person was not equal in the final dataset. Another attained goal was to gather roughly the same number of respondents from each country to ensure that the analysis was conducted equally for each country.

In the first section, participants were invited to answer demographic questions. Then, participants had to complete eight choice tasks. The food choice task was performed before testing the knowledge of the primary research subjects to avoid priming effects, and the precise topic and goal of the survey were disclosed at the end. In the final section of the questionnaire, participants were asked about their self-estimated level of label knowledge, purchasing frequency, importance, and the likelihood of the food categories with specific labels and expressing an attitude about certain statements.

Any potential bias associated with the presentation order of product combinations was eliminated by randomly arranging the combinations across the respondents. Therefore, one respondent saw only one combination per Study, which permitted avoidance of comparison between the combinations, minimising the learning and transfer across conditions. Indeed, a comparison would have skewed the results as the first genuine impression of the products would have faded, and respondents would have started to understand and guess the aim of the study. This between-subjects study design made the survey shorter and easier to implement, although requiring more respondents.

3.5. Data Analysis

The cleaned primary data were first analysed using descriptive statistics to extract main trends appearing mainly through the mean and confidence interval. Then, secondary data was generated using a regression analysis. Creating a model, the regression allowed to explain the relationships between the independent and dependent variables. A binary logistic regression was chosen with purchase intention as the dependent variable since it is dichotomous. Moreover, the data

obtained in the last questionnaire section on Purchasing Behaviour was analysed using descriptive statistics.

3.6. Ethical Considerations

The protection and respect of participants' rights and welfare were priorities of this study. The following ethical factors have been considered: awareness, voluntary participation, anonymity, and data protection.

Participants were informed about the general study's theme, the procedures involved, and their rights as participants before being asked to participate. After finishing the survey, they were provided information outlining the study's actual purpose. At any time, participants were also allowed to withdraw from the study without any negative consequence. Participation in the study was voluntary, and participants could not be coerced or pressured into participating, as well they were free to decline or withdraw from the study at any time without penalty. The collected data is securely saved and only accessible to the research team, not shared with any third party.

4. RESULTS

4.1. Sample Overview

The final research sample included 241 European consumers from France (79), Lithuania (83), and Norway (79) who took the online survey. The sample size between countries was almost equally distributed, with a difference of 4,82% between the biggest and the smallest samples. *Table 2* displays the percentage distribution of the sample by demographics according to each country.

Variables		Total Composition	France	Lithuania	Norway
Country of residence		100 %	32.8%	34.4%	32.8%
Gender	Female	64.7%	77.2%	60.2%	57.0%
	Male	34.9%	22.8%	39.8%	41.8%
	Other	0.4%	0.0%	0.0%	1.3%
Age Group	<18	0.8%	2.5%	0.0%	0.0%
	18-24	51.9%	70.9%	26.5%	59.5%
	25-34	30.7%	3.8%	51.8%	35.4%
	34-44	5.8%	1.3%	13.3%	2.5%
	45-54	6.6%	11.4%	6.0%	2.5%
	55-64	2.9%	6.3%	2.4%	0.0%
	>65	1.2%	3.8%	0.0%	0.0%
Employment Status	Employed	43.6%	27.9%	78.3%	22.8%
	Self-employed	4.6%	1.3%	10.8%	1.3%
	Unemployed	2.1%	3.8%	1.2%	1.3%
	Student	48.6%	63.3%	9.6%	74.7%
	Retired	1.2%	3.8%	0.0%	0.0%
Education Level	< High School	1.2%	3.8%	0.0%	0.0%
	High School Degree	19.5%	7.6%	16.9%	34.2%
	Professional Degree	3.7%	5.1%	2.4%	3.8%
	Bachelor's Degree	43.6%	24.1%	57.8%	48.1%
	Master's Degree	30.7%	57.0%	22.9%	12.7%
	Ph.D.	1.2%	2.5%	0.0%	1.3%

Table 2. Respondents' socio-demographic characteristics ($n = 241$) overall and broken down by country of residence

The sample was not equally gender-balanced, with 65% female and 35% male participants. The age of participants ranged from less than 18 to more than 65 years old, most of them being 18-24 years (52%) and 25-34 years (31%) old. Most participants had completed a university degree (Bachelor's degree - 44%, Master's degree - 31%, PhD - 1%). The employment status was divided into two major groups: employed (44%) and students (49%). The leftover 7% included self-employed, unemployed and retired participants. However, some students are

working, and the “Employed student” option was not included. In this case, an assumption was made that not only employed respondents but also students can have purchasing power. To summarise the sample, the survey’s primary participants are young female adults, highly educated, and have purchasing power since they work or study.

4.2. Descriptive Statistics

4.2.1. Descriptive Statistics of Study 1

4.2.1.1. General Descriptive Statistics of Study 1

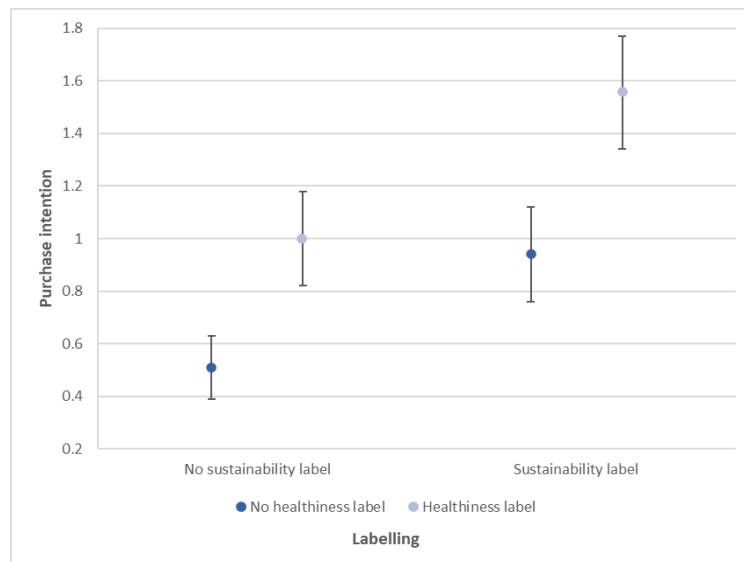
After answering demographic questions, respondents were provided with the opportunity to estimate pair-wise choices (DCE) from Study 1 to measure their purchase intention on a combination of sustainability and healthiness labels. Purchase intention values range from 0 to 4 as each variation has been shown four times, once per product. Therefore, the means should be around 1, considering that variations have equal choice probabilities. The sum of variation choices, the adjusted proportions of purchase intention according to the number of respondents per variation, means and 95% confidence interval (CI) of the purchase intention among products with different healthiness and sustainability label combinations are shown in *Table 3*.

Variations		Proportion*	Mean	95% CI
No sustainability label	No healthiness label	27%	0.51	[0.39, 0.62]
	Healthiness label	50%	1.00	[0.82, 1.18]
Sustainability label	No healthiness label	48%	0.94	[0.76, 1.11]
	Healthiness label	73%	1.56	[1.34, 1.77]

*Adjusted proportion of purchase intentions according to the number of respondents per variation

Table 3. Purchase intention statistics per variation

The reference proportion of purchase intentions should be 50% as respondents had to choose between two variations of the same product with equal probabilities of choice. *Graph 1* shows the interaction effect of respondents’ average purchase intention of choosing particular variations of Study 1. Here, we can see fluctuations depending on the variation.



Graph 1. The interaction effect of sustainability and healthiness labels on average purchase intention, with a 95% confidence interval

First, products with sustainability and healthiness labels obtained the highest average purchase intention of (1.56), whereas those without any labels obtained the lowest (0.51). Interestingly, the average purchase intention for products with only a healthiness label (1.00) and products with only a sustainability label (0.94) was slightly similar, showing that respondents consider these labels as equivalent when presented individually. This might align with Clark et al. (2019) research that foods with beneficial health impacts are also considered more sustainable.

When a sustainability label appears on the product, the purchase intention differs between variations with no labels and healthy nutrition labels. The combination of sustainability and healthiness labels has a higher purchase intention (1.56) than the separate healthiness labels (1.00). This could be related to the fact that people prefer and appreciate foods that benefit both: their health and the environment. These descriptive statistics results support Hypothesis 1.

4.2.1.2. Descriptive Statistics by Country of Study 1

Descriptive statistics results (the adjusted proportion of choices, means, and 95% confidence interval) of Study 1 DCE indicate no differences in purchase intention when broken down by country of residence (*Table 4*). Since each variation has been presented once for each product, the means should be 1, given

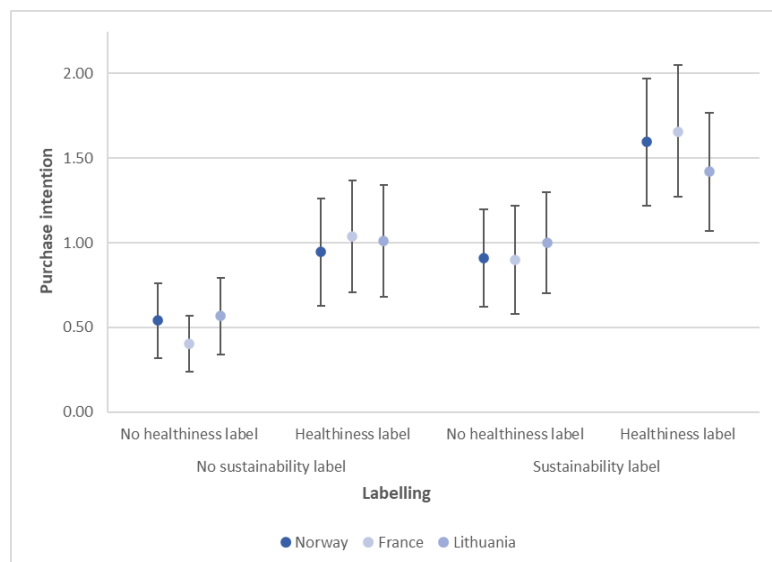
that each variation has an equal chance of being selected. Thus, differences in means for variations by country are similar to general descriptive statistics results.

Country	Variations		Proportion*	Mean	95% CI
Norway	No sustainability label	No healthiness label	29%	0.54	[0.32, 0.76]
		Healthiness label	47%	0.95	[0.63, 1.26]
	Sustainability label	No healthiness label	46%	0.91	[0.62, 1.20]
		Healthiness label	75%	1.59	[1.22, 1.97]
France	No sustainability label	No healthiness label	20%	0.41	[0.24, 0.57]
		Healthiness label	53%	1.04	[0.71, 1.37]
	Sustainability label	No healthiness label	48%	0.9	[0.58, 1.22]
		Healthiness label	80%	1.66	[1.27, 2.05]
Lithuania	No sustainability label	No healthiness label	32%	0.57	[0.34, 0.79]
		Healthiness label	50%	1.01	[0.68, 1.34]
	Sustainability label	No healthiness label	51%	1	[0.70, 1.30]
		Healthiness label	64%	1.42	[1.07, 1.77]

*Adjusted proportion of purchase intentions according to the number of respondents per variation

Table 4. Purchase intention descriptive statistics per country and variation

When looking at *Graph 2*, there is one particular visual discrepancy in the labelling effects on average purchase intention across Norway, France and Lithuania residents. Respondents from Lithuania have a slightly lower purchase intention mean (1.42) than from France (1.66) and Norway (1.56). However, it is not a remarkable difference as it follows the overall behaviour explained in the precedent section.



Graph 2. The interaction effect of sustainability and healthiness labels on average purchase intention across the countries, with a 95% confidence interval

4.2.1.3 Descriptive Statistics by Product of Study 1

Descriptive statistics results (the adjusted proportion of choices, means, and 95% confidence interval) of Study 1 DCE indicate one notable difference in purchase intention when breaking down by products (*Table 5*). As each variation has been shown once per product and because there are a total of 4 variations, the mean should be around 0.25, considering that variations have equal probabilities of choice per product. However, it is observed that there are dissimilarities in means for the different variations.

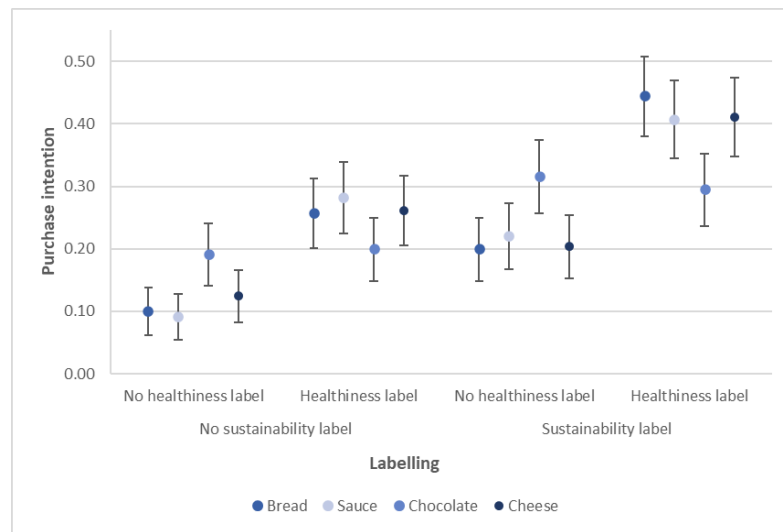
Products	Variations		Proportion*	Mean	95% CI
Bread	No sustainability label	No healthiness label	21%	0.1	[0.06, 0.14]
		Healthiness label	51%	0.26	[0.20, 0.31]
	Sustainability label	No healthiness label	41%	0.2	[0.15, 0.25]
		Healthiness label	83%	0.44	[0.38, 0.51]
Sauce	No sustainability label	No healthiness label	19%	0.09	[0.05, 0.13]
		Healthiness label	56%	0.28	[0.22, 0.34]
	Sustainability label	No healthiness label	45%	0.22	[0.17, 0.27]
		Healthiness label	76%	0.41	[0.34, 0.47]
Chocolate	No sustainability label	No healthiness label	40%	0.19	[0.14, 0.24]
		Healthiness label	40%	0.2	[0.15, 0.25]
	Sustainability label	No healthiness label	65%	0.32	[0.26, 0.37]
		Healthiness label	55%	0.29	[0.24, 0.35]
Cheese	No sustainability label	No healthiness label	26%	0.12	[0.08, 0.17]
		Healthiness label	52%	0.26	[0.21, 0.32]
	Sustainability label	No healthiness label	42%	0.2	[0.15, 0.25]
		Healthiness label	77%	0.41	[0.35, 0.47]

*Adjusted proportion of purchase intentions according to the number of respondents per variation

Table 5. Purchase intention descriptive statistics per product and variation

Indeed, chocolate stands out amongst the overall tendency of the other products. Most respondents chose a combination of healthiness and sustainability labels for bread (0.44), cheese (0.41) and sauce (0.41), which aligns with the general trend. At the same time, for chocolate, there was a higher selection for a combination with a sustainability label and no healthiness label (0.32). There is an assumption that this combination is based more on other aspects of the products (flavour or colour) than labels because dark chocolate was selected as the healthier alternative and milk chocolate as the less healthy option. Furthermore, the dark chocolate packaging was light blue, whereas the milk chocolate package was light beige, and there is evidence that colour significantly influences participants' chocolate preferences (Baptista et al., 2023). While looking at other

used products in the experiment, these differences (flavour or colour) were minor when comparing the healthier and less healthy options.



Graph 3. The interaction effect of sustainability and healthiness labels on average purchase intention across the products, with a 95% confidence interval

However, the difference between chocolate in average purchase intention when there is no sustainability label and between a healthiness label (0.2) or not (0.19) is minimal (*Graph 3*). This minimal moderating effect of healthiness labelling on average purchase intention could be explained by chocolate being a hedonic product for which healthiness labelling does not change purchase intentions, whereas sustainability labelling does.

4.2.2. Descriptive Statistics of Study 2

4.2.2.1. General Descriptive Statistics of Study 2

Following the opportunity to estimate pair-wise choices (DCE) from Study 1, respondents were also shown four options from Study 2 to measure their purchase intention related to combinations of sustainability labels and private/non-private brand labels. Purchase intention values range from 0 to 4 as each variation has been shown four times, once per product. Therefore the mean should be around 1, given that variations have equal probabilities of choice. However, it can be observed that there are differences in means for the different variations.

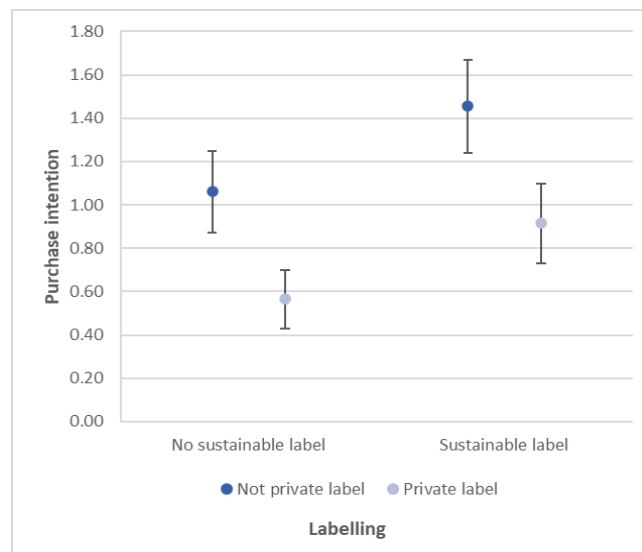
The sum of choices, the adjusted proportions of purchase intention according to the number of respondents per variation, means and 95% confidence interval of the purchase intention among product combinations of Study 2 are shown in *Table 6*. The reference proportion of purchase intentions should be 50% as respondents had to choose between two variations of the same product with equal probabilities of choice.

Variations		Proportion*	Mean	95% CI
No sustainability label	Not private label	52%	1.06	[0.87, 1.25]
	Private label	28%	0.56	[0.43, 0.70]
Sustainability label	Not private label	73%	1.46	[1.24, 1.67]
	Private label	48%	0.92	[0.73, 1.10]

*Adjusted proportion of purchase intentions according to the number of respondents per variation

Table 6. Purchase intention descriptive statistics per variation

Graph 4 shows the interaction effect of respondents' average purchase intention of choosing particular variations of Study 2. Here, we can see fluctuations depending on the variation.



Graph 4. The interaction effect of sustainability labels and private labels on average purchase intention, with a 95% confidence interval

Products with a sustainability label and not private labels obtained the highest purchase intention (1.46). In contrast, private-label products with no sustainability label obtained the lowest purchase intention (0.56). When a sustainability label appears on the product, the purchase intention differs between variations with private and non-private labels. Notably, the combination of sustainably and non-privately labelled (1.46) items is preferred over the combination of sustainability and private label (0.92). It might be explained that

respondents prefer more global brands than local store brands. However, these results contradict the initial Hypothesis 2, stating that private label products would have a higher purchase intention, suggesting a higher effect for non-private brands.

4.2.2.2. Descriptive Statistics by Country of Study 2

Descriptive statistics results (the adjusted proportion of choices, means, and 95% confidence interval) of Study 2 indicate several remarkable differences in purchase intention when broken down by country of residence (*Table 7*).

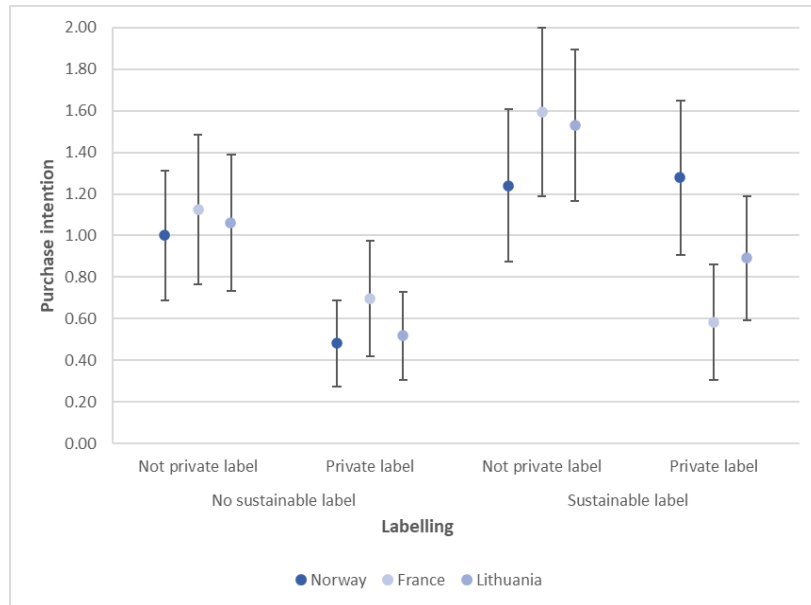
Country	Variations		Proportion*	Mean	95% CI
Norway	No sustainability label	Not private label	47%	1.00	[0.69, 1.31]
		Private label	25%	0.48	[0.27, 0.69]
	Sustainability label	Not private label	70%	1.24	[0.87, 1.61]
		Private label	59%	1.28	[0.91, 1.65]
France	No sustainability label	Not private label	51%	1.13	[0.77, 1.49]
		Private label	34%	0.70	[0.42, 0.97]
	Sustainability label	Not private label	73%	1.59	[1.19, 2.00]
		Private label	37%	0.58	[0.30, 0.86]
Lithuania	No sustainability label	Not private label	58%	1.06	[0.73, 1.39]
		Private label	25%	0.52	[0.31, 0.73]
	Sustainability label	Not private label	74%	1.53	[1.16, 1.90]
		Private label	44%	0.89	[0.59, 1.19]

*Adjusted proportion of purchase intentions according to the number of respondents per variation

Table 7. Purchase intention descriptive statistics per country and variation

In *Graph 5*, discrepancies across countries can be noticed, especially for the average purchase intention of private labels. Respondents living in France (1.59) and Lithuania (1.53) have a higher purchase intention for non-private label products, whether it has a sustainability label, in contrast to Norway (1.24). This means they prefer the most to choose international brands compared to local stores brands. Moreover, people from France chose more non-private label products without sustainability labels (0.70) than with them (0.58). So in this country, sustainability labels have a positive effect only for not private labels. However, in Norway, the purchase intention means are quite similar for variations with a sustainability label regardless of whether it is a private brand (1.28) or not (1.24). This indicates that Norwegian respondents value private and non-private label products equally if they have a sustainability label. In contrast, respondents from France and Lithuania prefer non-private food items with a sustainability

label. In Norway, purchase intention means for sustainability and private labels (1.28) are higher compared to France (0.58) and Lithuania (0.89). It makes an exception for Hypothesis 2, as purchase intention in Norway for private label (1.28) products is slightly higher than for non-private label (1.24) products when they came with a sustainability label.



Graph 5. The interaction effect of sustainability labels and private labels on average purchase intention across the countries, with a 95% confidence interval

4.2.2.3. Descriptive Statistics by Product of Study 2

Table 8 presents descriptive statistics results (the adjusted proportion, means, and 95% confidence interval) of Study 2, indicating several substantial effects among different food product purchase intentions.

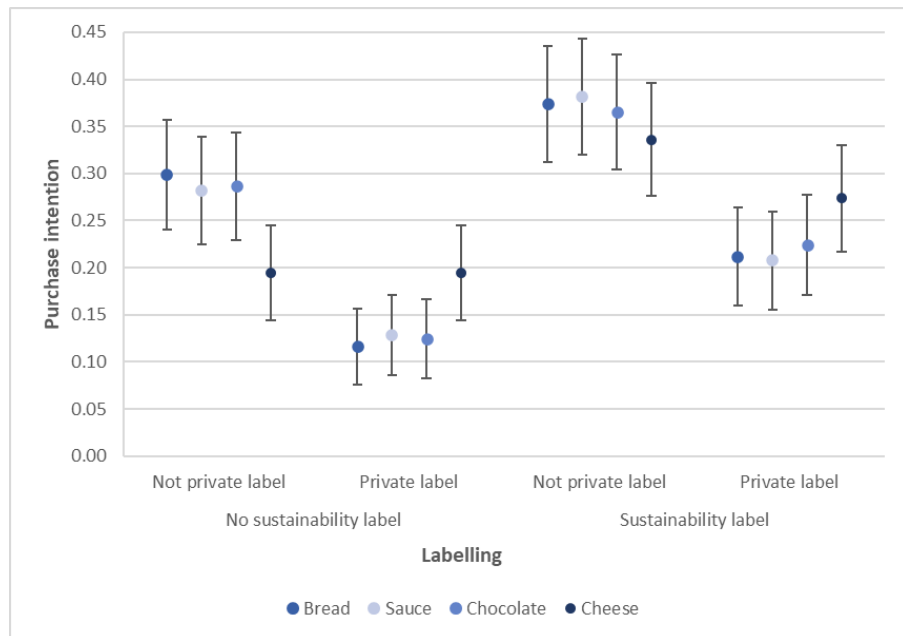
Products	Variations	Proportion*	Mean	95% CI	
Bread	No sustainability label	Not private label	58%	0.30	[0.24, 0.36]
		Private label	23%	0.12	[0.08, 0.16]
	Sustainability label	Not private label	74%	0.37	[0.31, 0.43]
		Private label	44%	0.21	[0.16, 0.26]
Sauce	No sustainability label	Not private label	55%	0.28	[0.22, 0.34]
		Private label	26%	0.13	[0.09, 0.17]
	Sustainability label	Not private label	76%	0.38	[0.32, 0.44]
		Private label	43%	0.21	[0.16, 0.26]
Chocolate	No sustainability label	Not private label	56%	0.29	[0.23, 0.34]
		Private label	25%	0.12	[0.08, 0.17]
	Sustainability label	Not private label	73%	0.37	[0.30, 0.43]
		Private label	47%	0.22	[0.17, 0.28]
Cheese	No sustainability	Not private label	38%	0.20	[0.14, 0.25]

	label	Private label	39%	0.20	[0.14, 0.25]
	Sustainability label	Not private label	67%	0.34	[0.28, 0.40]
		Private label	57%	0.27	[0.22, 0.33]

*Adjusted proportion of purchase intentions according to the number of respondents per variation

Table 8. Purchase intention descriptive statistics per product and variation

Cheese distinguishes itself from the general trend of the other goods, as seen in Graph 6. On average, more respondents selected the private label cheese with the sustainability label (0.27) compared to other products with the same labels (2.21; 0.22). Furthermore, almost the same number of people chose cheese for private (39%) and non-private (38%) labels without a sustainability label. These results show that private and non-private label cheese are seen almost as similar if they do not have a sustainability label. One research analysis shows that several sociodemographic characteristics influence the decision to purchase a private-label cheese product (Bouhlal & Capps, 2012), which might explain the observed discrepancy from the general trend.



Graph 6. The interaction effect of sustainability and private labels on average purchase intention across the products, with a 95% confidence interval

Overall, even after disaggregating results by product, sustainability labelling positively impacts both private and non-private label brands' purchase intention. Thus, Hypothesis 2 is still rejected as non-privately labelled different products in combination with a sustainable label have higher purchase intention than non-sustainably labelled private brands.

4.3. Regression Analysis

4.3.1. Regression Analysis of Study 1

A binary logistic regression was performed to ascertain the effects of product variations according to the presence of sustainability and healthiness labels on purchase intention. Purchase intention, measured on a 0 to 4 scale, was disaggregated into 4 to separate the effects of each food product. Therefore, the dependent purchase intention variable was dichotomous, with a value of either 1 or 0. Each variation type is a categorical variable: with a value of 1 if the product follows this variation (e.g., has a sustainability label and a healthiness label) and 0 if it does not follow. The benchmark variable taken as the comparison level is the product variation with no labels. Its coefficient of zero was used to analyse the differences in purchase intentions compared to the other variations.

It is noticeable that there are positive relationships between the variables in this model (*Table 17*). The combination of sustainability and healthiness labels (1.997) enhances the increase in purchase intention more strongly than just a sustainability label (0.951), compared to the benchmark variation. The small standard errors indicate low levels of uncertainty.

Variations		B	S.E.	Wald	df	Sig.	Exp(B)
No sustainability label	No healthiness label			191.687	3	<0.001	
	Healthiness label	1.011	0.139	52.608	1	<0.001	2.748
Sustainability label	No healthiness label	0.951	0.140	45.844	1	<0.001	2.587
	Healthiness label	1.997	0.145	190.721	1	<0.001	7.368
Constant		-1.019	0.106	93.087	1	<0.001	0.361

B = beta coefficient, S.E = standard error, Wald = Wald statistic, df = degrees of freedom, Sig. = significance, Exp(B) = exponential of beta

Table 17. Logistic regression results with purchase intention as the dependent variable and variation as the independent variable

The odds of being purchased are 7.368 times greater for products with sustainability and healthiness labels as opposed to no labels. The critical value of the Z-statistic with 3 degrees of freedom and a 95% confidence level is 7.815. Hence, all variations impact purchase intention, and all variables are statistically significant since their associated Wald values are superior to the critical value. Moreover, this is reinforced by the significance levels (Sig.), all under the p-value of 0.05.

According to Snell Cox & R Square, 10.6% of the variation in purchase intention is explained by the type of variation of products (*Table 18*). The R-square value is low, meaning the data is noisy and highly variable. However, it can have a significant trend. The trend indicates that even when data points are further away from the regression line, the predictor variable (label variations) still provides information about the outcome.

-2 Log likelihood	Snell Cox & R Square	Nagelkerke R Square
2456.602	0.106	0.141

Table 18. R Square measures

As shown in *Table 19*, adding demographic variables to the model increases by almost 100% the beta coefficients for the variations “No sustainability label & healthiness label” and “Sustainability label & healthiness label”. This means the interactions with purchase intention described above are strengthened when adding explanatory demographic variables to the model. However, “Gender”, “Age”, “Employment”, “Education”, or “Product” variables’ values are insignificant as all p-values are over 0.05, so no specific effect per demographics can be deduced. Further research would be required because this is an exploratory analysis not planned in this paper.

Variations		B	S.E.	Wald	df	Sig.	Exp(B)
No sustainability label	No healthiness label			197.956	3	<0.001	
	Healthiness label	2.080	0.148	196.922	1	<0.001	8.002
Sustainability label	No healthiness label	0.990	0.143	47.656	1	<0.001	2.690
	Healthiness label	1.069	0.143	55.642	1	<0.001	2.913
Country	France			2.493	2	0.288	
	Lithuania	-0.276	0.176	2.456	1	0.117	0.759
	Norway	-0.115	0.150	0.587	1	0.443	0.892
Gender	Female			1.323	2	0.516	
	Male	0.507	0.747	0.461	1	0.497	1.661
	Other	0.601	0.746	0.649	1	0.421	1.824
Age Group	<18			1.860	6	0.932	
	18-24	0.320	1.031	0.096	1	0.756	1.377
	25-34	0.104	0.632	0.027	1	0.869	1.110
	34-44	0.023	0.326	0.005	1	0.944	1.023
	45-54	0.144	0.327	0.195	1	0.659	1.155
	55-64	0.214	0.366	0.340	1	0.560	1.238
	>65	-0.071	0.354	0.041	1	0.840	0.931
Employment Status	Employed			1.950	3	0.583	
	Self-employed	-0.057	0.364	0.025	1	0.875	0.945
	Student	-0.146	0.431	0.115	1	0.734	0.864

	Retired	-0.244	0.361	0.458	1	0.498	0.783
Education Level	< High School			1.556	5	0.907	
	High School Degree	-0.146	0.268	0.297	1	0.585	0.864
	Professional Degree	-0.133	0.289	0.211	1	0.646	0.876
	Bachelor's Degree	-0.205	0.868	0.056	1	0.813	0.814
	Master's Degree	-0.265	0.271	0.957	1	0.328	0.767
	PhD	-0.100	0.513	0.038	1	0.845	0.905
Product	Bread			0.000	3	1.000	
	Chocolate	0.000	0.137	0.000	1	1.000	1.000
	Sauce	0.000	0.137	0.000	1	1.000	1.000
	Cheese	0.000	0.137	0.000	1	1.000	1.000
Constant		-1.213	0.913	1.767	1	0.184	0.297

B = beta coefficient, S.E = standard error, Wald = Wald statistic, df = degrees of freedom, Sig. = significance, Exp(B) = exponential of beta

Table 19. Logistic regression results with purchase intention as the dependent variable and variation & demographics as the independent variables

4.3.2. Regression Analysis of Study 2

A binary logistic regression was performed to ascertain the effects of product variations according to the presence of sustainability and private labels on purchase intention. Purchase intention, measured on a 0 to 4 scale, was disaggregated into 4 to separate the effects of each food product. Therefore, the dependent purchase intention variable was dichotomous, with a value of either 1 or 0. Each variation type is a categorical variable: with a value of 1 if the product follows this variation (e.g., has a sustainability label and is a private label) and 0 if it does not follow. The benchmark variable taken as the comparison level is the variation of the product with no sustainability label nor being a private label. The differences in purchase intentions were analysed compared to the different variations using its coefficient of zero.

Significantly, there are positive relationships for most of the variables in this model (*Table 20*). The variation sustainability label & private label has more purchase intention (0.819) than the variation no sustainability label & private label (0.731), compared to the benchmark variation. However, what stands out in these results is the small negative coefficient (-0.057) between the variation “Sustainability label & not private label” and purchase intention, which is insignificant. Indeed, the significance level (0.689) is over the p-value of 0.05, and the Wald value is too small.

Variations		B	S.E.	Wald	df	Sig.	Exp(B)
No sustainability label	Not private label			69.764	3	<0.001	
	Private label	0.731	0.135	29.372	1	<0.001	2.077
Sustainability label	Not private label	-0.057	0.142	0.160	1	0.689	0.945
	Private label	0.819	0.136	36.205	1	<0.001	2.267
Constant		-0.913	0.099	84.566	1	<0.001	0.401

B = beta coefficient, S.E = standard error, Wald = Wald statistic, df = degrees of freedom, Sig. = significance, Exp(B) = exponential of beta

Table 20. Logistic regression results with purchase intention as the dependent variable and variation as the independent variable

The odds of being purchased are 2.267 times greater for private labels with no sustainability label than for no labels. The critical value of the Z-statistic with 3 degrees of freedom and a 95% confidence level is 7.815. Hence, most variations impact purchase intention and most variables, apart from the one mentioned above, are statistically significant since their associated Wald values are superior to the critical value and have a significance level under the p-value. The small standard errors indicate low levels of uncertainty.

According to Snell Cox & R Square, 3.6% of the variation in purchase intention is explained by the type of variation of products (*Table 21*). The R-squared value is low, meaning the data is noisy and has high variability. However, it can have a significant trend. The trend illustrates that even when data points are distributed further from the regression line, the predictor variable (label variations) still provides information about the outcome.

-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
2472.318	0.036	0.050

Table 21. R Square measures

The logistic regression analysis run with the additional variable country transforms the beta coefficients into negative for the variations “No sustainability label & private label” and “Sustainability label & private label” (*Table 22*). Looking at the exponentials of these beta coefficients, this means that the odds of purchase intention for the two variations were decreased by around 80%, to 55.5% (1 - 0.445) for “No sustainability label & private label” and 57% (1 - 0.430) for “Sustainability label & private label”. Therefore, the interaction with purchase intention decreases when adding the variable country of residence in the model. Moreover, the additional benchmark variable taken as the comparison level is the variation “France”. Negative beta coefficients indicate that the odds ratio is less than 1, implying that the odds of purchase intentions for respondents from

Lithuania ($1 - 0.605 = 0.395 \approx 40\%$) or Norway ($1 - 0.632 = 0.368 \approx 37\%$) are lower than for France (country of reference).

Variations		B	S.E.	Wald	df	Sig.	Exp(B)
No sustainability label	Not private label			67.516	3	<0.001	
	Private label	-0.810	0.137	34.915	1	<0.001	0.445
Sustainability label	Not private label	-0.059	0.131	0.205	1	0.651	0.942
	Private label	-0.844	0.139	36.950	1	<0.001	0.430
Country	France			22.559	2	<0.001	
	Lithuania	-0.503	0.119	17.820	1	<0.001	0.605
	Norway	-0.459	0.117	15.489	1	<0.001	0.632
Constant		0.205	0.113	3.278	1	0.070	1.228

B = beta coefficient, S.E = standard error, Wald = Wald statistic, df = degrees of freedom, Sig. = significance, Exp(B) = exponential of beta

Table 22. Logistic regression results with purchase intention as the dependent variable and variation & country as independent variables

When the regression analysis was carried out with the variable “product” (Table 23), effects on purchase intention were similar to when adding the variable country of residence. The odds of purchase intention for the two variations were also decreased by around 80%, to 56.4% ($1 - 0.436$) for the “No sustainability label & Private label” and 58.8% ($1 - 0.412$) for the “Sustainability label & Private label”. Therefore, the interactions with purchase intention are as well decreased when adding the variable product to the model. Furthermore, it showed significance only for sauce and bread, which have a positive relationship with purchase intention. The additional benchmark variable taken as the comparison level is the variation “Bread”. The sauce has a 72% higher purchase intention than Bread ($1.719 - 1 = 0.719$).

Variations		B	S.E.	Wald	df	Sig.	Exp(B)
No sustainability label	Not private label			70.604	3	<0.001	
	Private label	-0.830	0.137	36.681	1	<0.001	0.436
Sustainability label	Not private label	-0.089	0.131	0.457	1	0.499	0.915
	Private label	-0.888	0.139	40.854	1	<0.001	0.412
Product	Bread			25.301	3	<0.001	
	Sauce	0.542	0.135	16.038	1	<0.001	1.719
	Chocolate	0.057	0.138	0.171	1	0.679	1.059
	Cheese	-0.058	0.139	0.174	1	0.676	0.944
Constant		-0.230	0.126	3.338	1	0.068	0.794

B = beta coefficient, S.E = standard error, Wald = Wald statistic, df = degrees of freedom, Sig. = significance, Exp(B) = exponential of beta

Table 23. Logistic regression results with purchase intention as the dependent variable and variation & product as independent variables

Adding the variable gender to the model barely changes the beta coefficients for the variations “No sustainability label & private label” and “Sustainability label & private label” (Table 24). This means that the interactions with purchase intention described in the original model are the same as when adding the variable gender in the model. Moreover, the variable “gender” is significant only for males and females, positively related to purchase intention. The additional benchmark variable taken as the comparison level is the variation “Female”. Results show that males have an 87% higher purchase intention than females ($1.870 - 1 = 0.870$).

Variations		B	S.E.	Wald	df	Sig.	Exp(B)
No sustainability label	Not private label			65.024	3	<0.001	
	Private label	0.710	0.137	26.961	1	<0.001	2.034
Sustainability label	Not private label	0.001	0.144	0.000	1	0.994	1.001
	Private label	0.855	0.138	38.199	1	<0.001	2.350
Gender	Female			38.629	2	<0.001	
	Male	0.626	0.101	38.629	1	<0.001	1.870
	Other	21.592	14202.132	0.000	1	0.999	2384176067.147
Constant		-1.170	0.110	113.825	1	<0.001	0.310

B = beta coefficient, S.E = standard error, Wald = Wald statistic, df = degrees of freedom, Sig. = significance, Exp(B) = exponential of beta

Table 24. Logistic regression results with purchase intention as the dependent variable and variation & gender as independent variables

Table 25 shows the results of regression analysis run with the variable “Age”. The effects on purchase intention were similar when adding this variable and the interactions with purchase intention described in the original model remain the same. The benchmark variable taken as the comparison level is the variation “<18”. The variable “Age” is significant only for the 34-44 year-olds with a strong negative beta coefficient (-1.309). However, it cannot be compared with the benchmark variable as “<18”, which has a significance of 0.1, which is more than the p-value, and therefore is not significant.

Variations		B	S.E.	Wald	df	Sig.	Exp(B)
No sustainability label	Not private label			66.949	3	<0.001	
	Private label	0.720	0.136	28.044	1	<0.001	2.055
Sustainability label	Not private label	-0.035	0.143	0.061	1	0.804	0.965
	Private label	0.828	0.137	36.671	1	<0.001	2.288
Age	<18			10.646	6	0.100	
	18-24	-0.913	0.529	2.981	1	0.084	0.401
	25-34	-0.773	0.531	2.122	1	0.145	0.461

	34-44	-1.309	0.566	5.354	1	0.021	0.270
	45-54	-0.937	0.558	2.813	1	0.093	0.392
	55-64	-0.763	0.594	1.652	1	0.199	0.466
	>65	-0.327	0.669	0.238	1	0.625	0.721
Constant		-0.045	0.531	0.007	1	0.932	0.956

B = beta coefficient, S.E = standard error, Wald = Wald statistic, df = degrees of freedom, Sig. = significance, Exp(B) = exponential of beta

Table 25. Logistic regression results with purchase intention as the dependent variable and variation & age as independent variables

Table 26 represents the results of the binary logistic regression with the added variable “employment status”. The effects on purchase intention were similar to when adding this variable, and the interactions with purchase intention described in the original model remain the same. The benchmark variable taken as the comparison level is the variation “employed”. The variable is significant only for “students” with a strong negative relationship (-1.431) with purchase intention. Unfortunately, it cannot be compared to “employed” respondents, as this variable is insignificant.

Variations		B	S.E.	Wald	df	Sig.	Exp(B)
No sustainability label	Not private label			70.129	3	<0.001	
	Private label	0.740	0.135	29.894	1	<0.001	2.095
Sustainability label	Not private label	-0.049	0.143	0.119	1	0.730	0.952
	Private label	0.827	0.136	36.739	1	<0.001	2.286
Employment Status	Employed			6.888	4	0.142	
	Self-employed	-0.559	0.423	1.751	1	0.186	0.572
	Unemployed	-0.479	0.473	1.028	1	0.311	0.619
	Student	-1.431	0.578	6.138	1	0.013	0.239
	Retired	-0.518	0.422	1.503	1	0.220	0.596
Constant		-0.376	0.423	0.790	1	0.374	0.687

B = beta coefficient, S.E = standard error, Wald = Wald statistic, df = degrees of freedom, Sig. = significance, Exp(B) = exponential of beta

Table 26. Logistic regression results with purchase intention as the dependent variable and variation & employment status as independent variables

Table 27 shows regression analysis results run with the variable “education level”. The effects on purchase intention were similar; when adding this variable, the interactions with purchase intention described in the original model remained the same. The variable “education level” is significant for respondents with a “Professional Degree”, “Bachelor’s Degree,” and “Master’s degree”, as the variables have a strong positive relationship with purchase intention. The additional benchmark variable taken as the comparison level is the variation

“<High School”. Respondents with a Bachelor’s degree have 6.069 times the odds of the respondents who have less than a High school diploma of purchase intention.

Variations		B	S.E.	Wald	df	Sig.	Exp(B)
No sustainability label	Not private label			67.879	3	<0.001	
	Private label	0.768	0.137	31.389	1	<0.001	2.155
Sustainability label	Not private label	-0.028	0.144	0.037	1	0.847	0.973
	Private label	0.819	0.138	35.073	1	<0.001	2.268
Education Level	< High School			51.983	5	<0.001	
	High School Degree	1.174	0.697	2.833	1	0.092	3.234
	Professional Degree	1.164	0.566	4.234	1	0.040	3.202
	Bachelor’s Degree	1.803	0.605	8.884	1	0.003	6.069
	Master’s Degree	1.381	0.559	6.095	1	0.014	3.980
	PhD	0.633	0.563	1.266	1	0.261	1.884
Constant		-2.054	0.566	13.160	1	<0.001	0.128

B = beta coefficient, S.E = standard error, Wald = Wald statistic, df = degrees of freedom, Sig. = significance, Exp(B) = exponential of beta

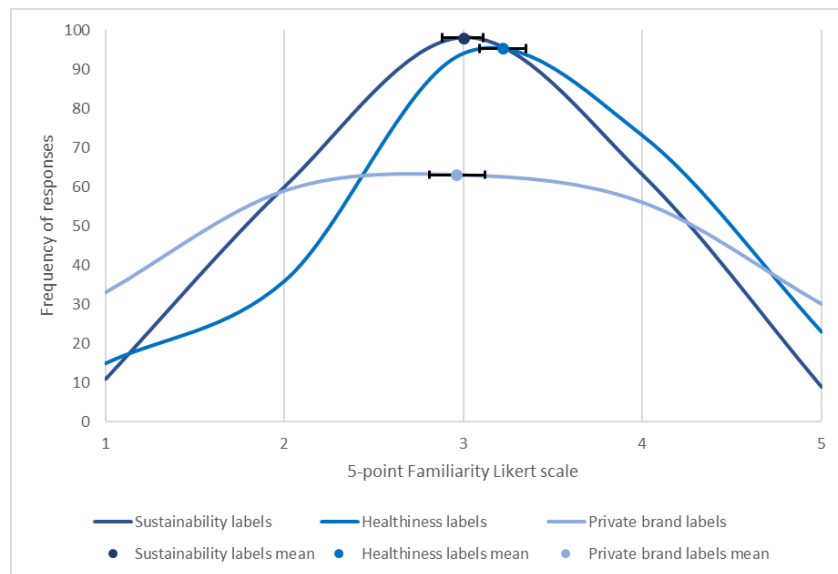
Table 27. Logistic regression results with purchase intention as the dependent variable and variation & education level as the independent variables

4.4. Analysis of Purchasing Behaviour

4.4.1. General Analysis of Purchasing Behaviour

After the DCE part of the questionnaire, respondents were asked to rate their answers on a Likert scale for several purchasing behaviour questions related to labels.

The first question asked participants about their awareness and familiarity with various labels, and *Graph 7* shows the results. Looking at the mean, most respondents are moderately familiar with sustainability (3.00) and quite familiar with healthiness labels (3.22). However, the distribution is more comprehensive for the familiarity with private brand labels (2.96): around the same number of respondents selected the slightly familiar (59), moderately familiar (63), and very familiar (56) options. Responses suggest that respondents better recognise sustainability labels and less private label brands.



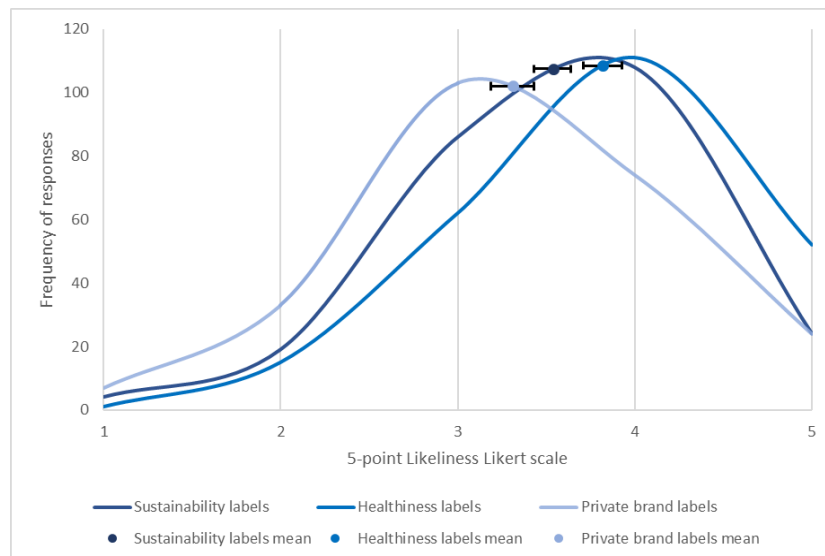
Graph 7. Frequency of responses and means (95% confidence interval) about familiarity with different labels, on a Likert Scale from 1 - "Not familiar" to 5 - "Extremely familiar"

The correlations (Table 9) between sustainability labels and healthiness or private brand labels are all significant and show that familiarity among labels has a direct relationship. Sustainability labels with healthiness labels have a moderate positive correlation ($r = 0.503$), while they have a weak positive correlation with private labels ($r = 0.366$). These results show that when respondents are familiar with sustainability labels, they are also more familiar with healthiness labels. Moreover, the weak positive correlation ($r = 0.374$) between healthiness and private brand labels confirms the predicted absence of interaction between the moderators of this study, which will not be elaborated on further in this study.

How familiar are you with:		sustainability labels	healthiness labels	private brand labels
sustainability labels	Pearson Correlation	--		
	Significance			
healthiness labels	Pearson Correlation	0.503		
	Significance	<0.001		
private brand labels	Pearson Correlation	0.366	0.374	
	Significance	<0.001	<0.001	

Table 9. Correlations of familiarity across labels

The results of the second question about participants' tendency to purchase goods with different labels are presented in Graph 8. According to the mean, the majority of consumers are slightly more likely to buy food products with sustainability (3.54), healthiness labels (3.82), and private brand labels (3.31). This indicated that respondents tend to buy items with all three types of labels.



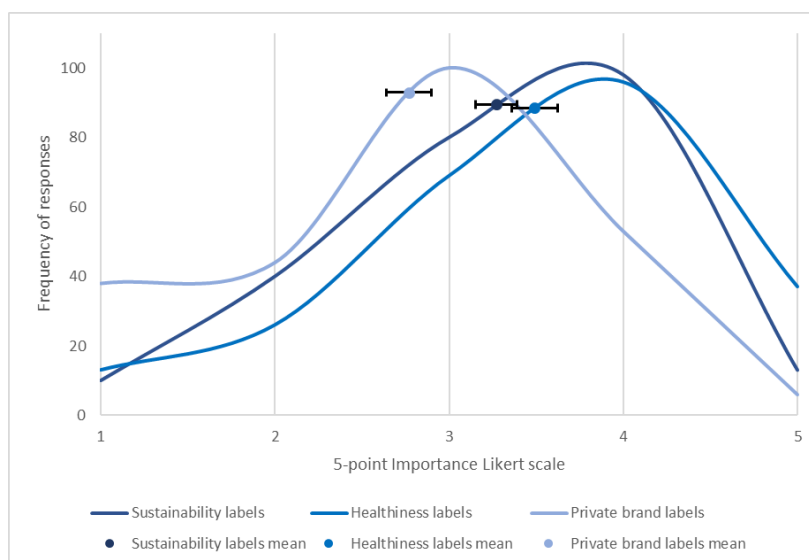
Graph 8. Frequency of responses and means (95% confidence interval) about likeliness to purchase food products with different labels, on a Likert Scale from 1 - “Extremely unlikely” to 5 - “Extremely likely”

The correlation (Table 10) between the sustainability labels and healthiness labels purchasing is significant and positive, but weak ($r = 0.371$). As a result, a weak positive correlation indicates that, while both variables tend to increase the likelihood of purchasing products with stated labels, the relationship is not very strong in response to one another. Moreover, the correlation between private labels and sustainability or healthiness labels purchasing is insignificant and cannot show any meaningful relationship.

How likely are you to purchase food products with:		sustainability labels	healthiness labels	private brand labels
sustainability labels	Pearson Correlation	--		
	Significance			
healthiness labels	Pearson Correlation	0.371		
	Significance	<0.001		
private brand labels	Pearson Correlation	0.058	0.018	
	Significance	0.372	0.784	

Table 10. Correlations of likeliness to purchase food products with different labels

The third question was regarding participants’ perceptions of the importance of different food product labels. Looking at the mean, most people find sustainability (3.27) and healthiness (3.49) labels slightly important, whereas they have a more neutral opinion about private brand labels (2.77) (Graph 9). This clarifies that sustainability and healthiness labels are more relevant when buying food items.



Graph 9. Frequency of responses and means (95% confidence interval) about importance of different labels, on a Likert Scale from 1 - “Not important” to 5 - “Very important”

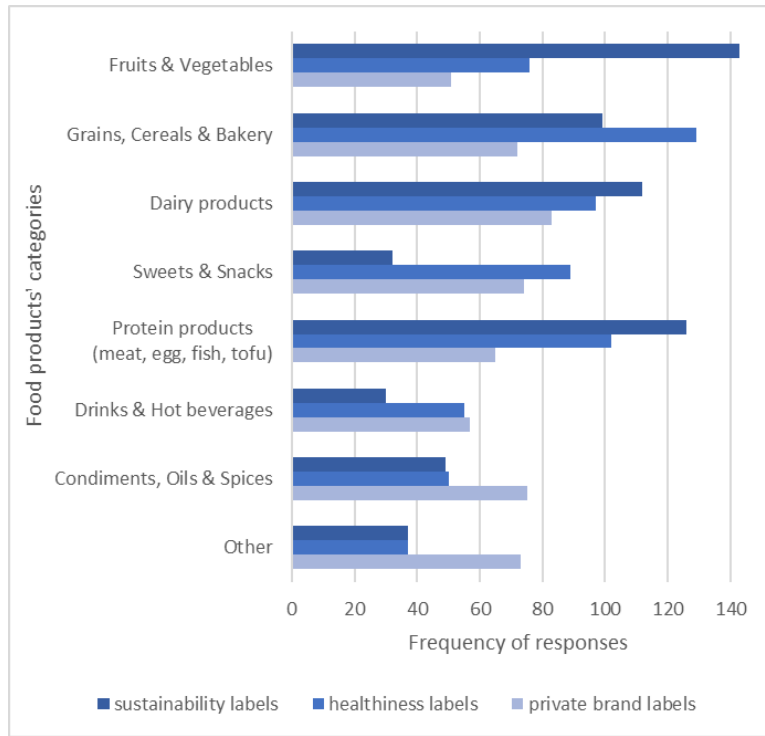
The correlations (Table 11) between the sustainability labels and healthiness ($r = 0.382$) or private brand ($r = 0.211$) labels are all significant, but positively weak, showing that importance accorded to labels tends slightly to go together. The correlation between healthiness and private labels is also positive but very weak ($r = 0.187$). According to these results, a weak positive correlation means that, while both variables tend to rise in reaction to one another, the relationship is not very strong. However, this interaction falls out of this research’s scope and will not be elaborated on further.

How important are the following labels when deciding which food products to purchase:		sustainability labels	healthiness labels	private brand labels
sustainability labels	Pearson Correlation	--		
	Significance			
healthiness labels	Pearson Correlation	0.382		
	Significance	<0.001		
private brand labels	Pearson Correlation	0.211	0.187	
	Significance	0.001	0.004	

Table 11. Correlations of importance of different labels

The following question, “What kind of food products do you usually buy with these labels” was asked to respondents covering eight main food categories, including one for “Other.” This question helps to understand participants’ use of labels on different food products (Graph 10). A majority of people answered that they usually buy more goods with sustainability labels in the category of Fruits & Vegetables (143), Dairy products (112), and Protein products (126). Healthiness

labels were more prevalent for frequently purchasing food products such as Grain, Cereals & Bakery (129) and Sweets & Snacks (89). Private brand labels gathered more purchase intentions for food categories like Drinks & Hot beverages (57), Condiments, Oils & Spices (75), as well as the Other (73) food products categories.



Graph 10. Purchase frequency of food products' categories according to the labels

Participants' attitude about labels on food products was measured using a set of 9 questions. Agreements with the statements were measured on a scale from 1 to 5 (1 - Strongly disagree, 2 - Disagree, 3 - Neither agree nor disagree, 4 - Agree, 5 - Strongly agree). Table 12 presents summarised results of the average and highest ratings of respondents.

Statements	Mean	95% CI
Healthiness labels provide important information about the nutritional value of food products.	3.68	[3.57, 3.78]
Sustainability labels provide important information about the environmental and social impact of food products.	3.69	[3.59, 3.80]
Private-label food products are more affordable than branded products.	3.55	[3.42, 3.67]
Sustainability labels are more relevant for branded food products, than for private-label products.	3.02	[2.91, 3.14]
Sustainability labels are important for all food products, not just branded ones.	3.98	[3.88, 4.08]
Healthy food products are more likely to have sustainability labels compared to unhealthy products.	3.61	[3.51, 3.71]

Food products with sustainability labels are more likely to be of higher quality.	3.46	[3.36, 3.57]
All healthier food products should have healthiness labels to be considered healthy to use.	3.16	[3.02, 3.30]
Food products can still be sustainable, even without sustainability labels.	3.92	[3.82, 4.02]

Table 12. The average rating of statements with a 95% confidence interval

Most respondents slightly agree that healthiness (3.68) and sustainability (3.69) labels on food products provide beneficial information. Thus, most people agree that food products can still be sustainable, even without sustainability labels (3.92). However, participants neither agree nor disagree that sustainability labels are more relevant for internationally branded food products than private-label products (3.02). Moreover, they agree that sustainability labels are important for all food products, not just branded ones (3.98). Additionally, respondents agree that food products with sustainability labels are more likely to be of higher quality (3.46).

On average, people have a neutral opinion that all healthier food products should have healthiness labels to be considered healthy to use (3.16). Nevertheless, most respondents agree that healthy food products are more likely to have sustainability labels than unhealthy products (3.61).

4.4.2. Analysis of Purchasing Behaviour by Country

Descriptive statistics results of Purchasing behaviour indicate several notable differences in purchase intention when broken down by country of residence (*Tables 13, 14 & 15*).

Respondents from Norway are more familiar with private brand labels (3.19) than those from France (3.00) and Lithuania (2.71), and are more likely to purchase private labels (3.52). Overall French participants are more familiar with (3.52), and are more likely to purchase (3.99) products with healthiness labels than in Norway and Lithuania. Moreover, people from Lithuania have the lowest familiarity, importance, and likeliness of purchase for all three labels mentioned above compared to Norway and France.

Country	How familiar are you with:					
	sustainability labels		healthiness labels		private brand labels	
	Mean	95% CI	Mean	95% CI	Mean	95% CI
Norway	3.11	[2.89, 3.33]	3.24	[2.99, 3.49]	3.19	[2.88, 3.50]
France	3.01	[2.81, 3.22]	3.52	[3.32, 3.72]	3.00	[2.70, 3.30]
Lithuania	2.87	[2.68, 3.05]	2.92	[2.70, 3.13]	2.71	[2.51, 2.91]
TOTAL	3.00	[2.88, 3.11]	3.22	[3.09, 3.35]	2.96	[2.81, 3.12]

Table 13. The average familiarity with different labels per country, with a 95% confidence interval

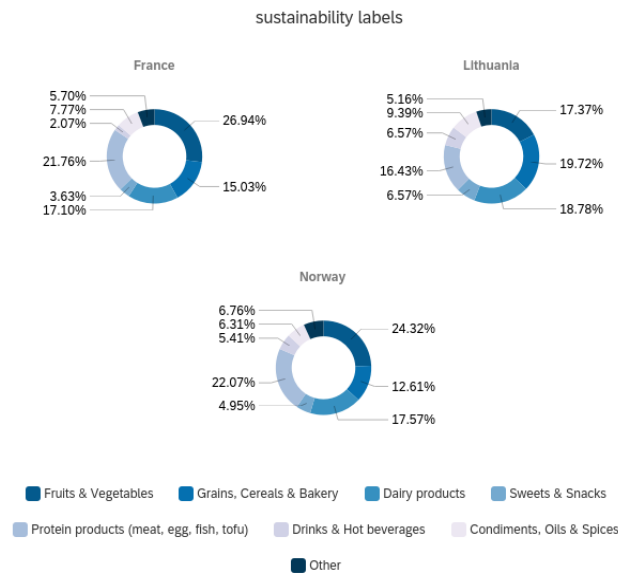
Country	How likely are you to purchase food products with:					
	sustainability labels		healthiness labels		private brand labels	
	Mean	95% CI	Mean	95% CI	Mean	95% CI
Norway	3.65	[3.45, 3.84]	3.89	[3.71, 4.06]	3.52	[3.31, 3.72]
France	3.67	[3.50, 3.84]	3.99	[3.80, 4.18]	3.20	[2.95, 3.46]
Lithuania	3.30	[3.11, 3.49]	3.60	[3.41, 3.80]	3.22	[3.07, 3.36]
TOTAL	3.54	[3.43, 3.64]	3.82	[3.71, 3.93]	3.31	[3.19, 3.43]

Table 14. The average likeliness of purchasing food products with different labels per country, with a 95% confidence interval

Country	How important are the following labels when deciding which food products to purchase:					
	sustainability labels		healthiness labels		private brand labels	
	Mean	95% Confidence Interval	Mean	95% Confidence Interval	Mean	95% Confidence Interval
Norway	3.24	[3.02, 3.46]	3.37	[3.13, 3.60]	2.78	[2.55, 3.02]
France	3.33	[3.11, 3.54]	3.56	[3.31, 3.81]	2.77	[2.52, 3.03]
Lithuania	3.23	[3.03, 3.43]	3.54	[3.33, 3.76]	2.76	[2.55, 2.97]
TOTAL	3.27	[3.15, 3.39]	3.49	[3.36, 3.62]	2.77	[2.64, 2.90]

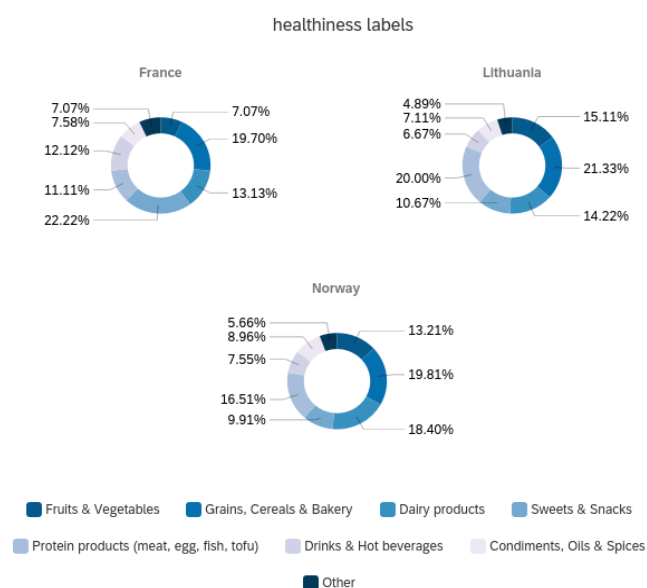
Table 15. The average importance of different labels per country, with a 95% confidence interval

The respondents' answers, per country, on which food products categories they purchase from when there is a sustainability label are displayed in *Graph 11*. When food products have a sustainability label, respondents from France purchase more Fruits & Vegetables (26.94%) and Protein products (21.76%). In contrast, respondents from Lithuania purchase more Grains, Cereals & Bakery (19.72%) and Dairy products (18.78%). Norwegian respondents purchase more Fruits & Vegetables (24.32%) and Protein products (22.07%) with a sustainability label.



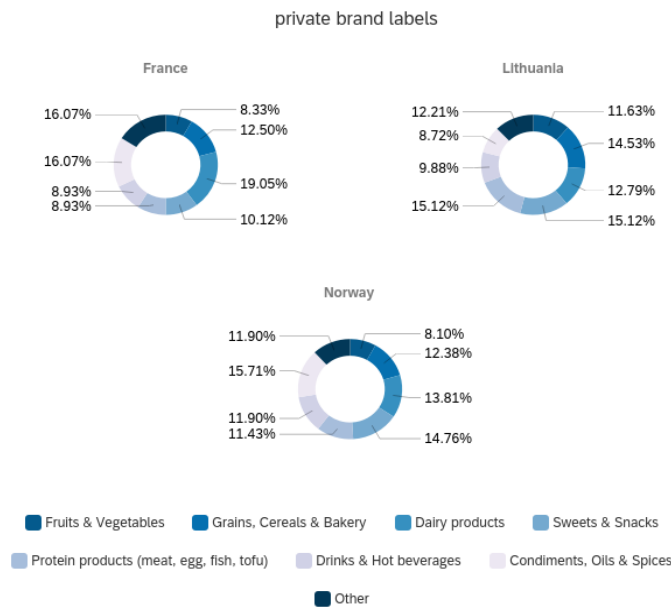
Graph 11. Purchase frequency of food products' categories with a sustainability label per country

Purchase choices for food products' categories with a healthiness label per country are presented in *Graph 12*. When food products have a healthiness label, from all countries, respondents similarly buy most Grains, Cereals & Bakery (France - 19.70%, Lithuania - 21.33%, Norway - 19.81%). Other higher requested categories with healthiness labels vary across the countries. Respondents from France purchase more Sweets & Snacks (22.22%). In contrast, respondents from Lithuania purchase more Protein products (20.00%), and respondents from Norway purchase more Dairy products (18.40%).



Graph 12. Purchase frequency of food products' categories with a healthiness label per country

Graph 13 shows choices of food products' categories with a private brand label, per country. When products have a private brand label, respondents from France purchase more "Dairy products" (19.50%), "Condiments, Oils and Spices" (16.07%), as well as "Other" (16.07%) types of products. In comparison, respondents from Lithuania purchase more "Sweets and Snacks" (15.12%), and "Protein products" (15.12%). At the same time, Norwegian respondents purchase the most "Condiments, Oils and Spices" (15.71%).



Graph 13. Purchase frequency of food products' categories with a private brand label per country

A difference can be noticed in the repartition of agreement among the countries for a couple of statements (Table 16). People from France tend to agree around 25% less than people from Lithuania that all healthier food products should have healthiness labels to be considered healthy and that sustainability labels are more relevant for branded food products than private-label products. On average more Norwegian respondents agree that food products can still be sustainable, even without sustainability labels, and healthy food products are more likely to have sustainability labels compared to unhealthy products, compared to the Lithuanian and French respondents.

How much do you agree with the following statements?	Norway	France	Lithuania	TOTAL	95% CI
Healthiness labels provide important information about the nutritional value of food products.	3.63	3.87	3.53	3.68	[3.57, 3.78]
Sustainability labels provide important information about the environmental and social impact of food products.	3.65	3.75	3.69	3.69	[3.59, 3.80]
Private-label food products are more affordable than branded products.	3.63	3.87	3.16	3.55	[3.42, 3.67]
Sustainability labels are more relevant for branded food products, than for private-label products.	3.11	2.65	3.30	3.02	[2.91, 3.14]
Sustainability labels are important for all food products, not just branded ones.	4.04	4.14	3.78	3.98	[3.88, 4.08]
Healthy food products are more likely to have sustainability labels compared to unhealthy products.	3.72	3.42	3.69	3.61	[3.51, 3.71]
Food products with sustainability labels are more likely to be of higher quality.	3.51	3.58	3.31	3.46	[3.36, 3.57]
All healthier food products should have healthiness labels to be considered healthy to use.	3.23	2.56	3.66	3.16	[3.02, 3.30]
Food products can still be sustainable, even without sustainability labels.	4.14	4.08	3.55	3.92	[3.82, 4.02]

Table 16. Average rating of statements per country, with a 95% confidence interval

4.5. Summary of Results

1. Hypothesis 1 - A combination of sustainability and healthiness labels has a greater choice selection and purchase intention than only sustainably labelled food products without a healthiness label - was confirmed by the results of the analyses. The combination of sustainability and healthiness labels has the highest purchase intention than healthiness or sustainability labels separately in the descriptive statistics and the binary logistic regression analysis.
2. Hypothesis 1 has an exception when broken down by products. Products “Bread”, “Sauce” and “Cheese” follow the general trend. However, for “Chocolate” there was a higher selection for a combination of a sustainability label and no healthiness label (0.32).
3. Hypothesis 2 - A combination of sustainability and private labels has a greater choice selection and purchase intention than only no sustainably labelled private and non-private food products - was rejected by the results of the analyses. The descriptive statistics demonstrate that combining sustainability and non-private labels has greater purchase intention than combining with private labels. However, the binary logistic regression could not confirm this as the sustainability and non-private labels variation result was not significant enough in the model.

4. Hypothesis 2 has an exception when broken down by respondents' country of residence. Purchase intention in Norway for private label (1.28) products is slightly higher than for non-private label (1.24) products when they came with a sustainability label. As well, Norwegian respondents value private and non-private label products equally if they have a sustainability label compared to France and Lithuania.
5. Participants' awareness analysis of different food labels indicated that they are moderately familiar with sustainability (3.00), healthiness (3.22), and private brand (2.96) labels. Moreover, sustainability labels have a moderately stronger relationship with healthiness labels ($r = 0.503$) than private labels ($r = 0.366$).
6. The majority of participants are more likely to buy food products with sustainability (3.54), healthiness labels (3.82), and private brand labels (3.31). Broken down by food category, they usually buy more Fruits & Vegetables (143), Dairy products (112), and Protein products (126) with sustainability labels. Grain, Cereals & Bakery (129) and Sweets & Snacks (89) were the most frequently purchased food products with healthiness labels. Food product categories such as Drinks & Hot beverages (57), Condiments, Oils & Spices (75), and Other (73) reached more purchase intentions with private brand labels.
7. Participants' perceptions analysis of the importance of different food product labels demonstrates that sustainability (3.27) and healthiness (3.49) labels were slightly important for respondents. In contrast, they had a more neutral opinion about private brand labels (2.77). Furthermore, the correlations between sustainability labels and healthiness ($r = 0.382$) or private brand ($r = 0.211$) labels are positive but weak.
8. An analysis of participants' attitudes about labels on food products shows that most respondents agree that healthy food products are more likely to have sustainability labels than unhealthy products, and sustainability labels are important for all food products, not just branded ones.
9. Looking at the differences between countries, it is notable that in Norway, purchase intention for sustainability and private labels (1.28) is higher compared to France (0.58) and Lithuania (0.89).

5. CONCLUSIONS

1. This research aimed to identify how various sustainability-labelled food products' purchase intentions are affected by the moderating factors of healthiness and private labels. Based on a quantitative analysis of purchase intention in pair-wise choices, it can be concluded that healthiness labels positively affect purchase intention in combination with a sustainability label as it has the highest average of purchase intention. In contrast, non-private products combined with sustainability labels have a greater positive effect on purchase intention compared to private labels.
2. This research provides new insight into the distinction of purchasing intention across different European countries: respondents from Norway value private and non-private label products equally if they have a sustainability label, while respondents from France and Lithuania prefer non-private food products with a sustainability label.
3. The purchase intention analysis of sustainability and healthiness labels has shown that separately sustainability and healthiness front-of-package labels have almost equal purchasing intention averages. In the literature, it has been recognised that separate sustainability and healthiness labels have a beneficial effect on purchasing intention. However, it was not noted that the effects were almost equivalent.
4. The literature review states that non-private label and private label items in combination with sustainability labels are perceived similarly and have the same positive effect on purchasing intention. However, this study illustrates that there is generally a better effect for non-private brands. Moreover, it raises a notable difference when broken down by products. For Cheese and Sauce, the sustainability label increases purchase intention more for the non-private label, while for Bread and Chocolate, the increase is higher for private labels.
5. Further research is needed to determine in detail the effects of all three labels for a wider variety of products in all food categories, as this paper has detected that likelihood of buying products with separate labels varies across different food categories.

6. LIMITATIONS AND RECOMMENDATIONS

1. The study was carried out only on three countries (Lithuania, France, Norway) chosen to represent Europe. However, conducting it in several other countries or continents could help reveal differences in consumer behaviour across geographic areas.
2. The panel of respondents could have been larger, more diverse and balanced. Therefore reducing sample bias would allow for more statistical power and the ability to generalise.
3. This study's choice of labels (the imitation sustainability label, FoPLs: Green Keyhole and Nutri-score) narrowed respondents' possible knowledge and awareness, limiting relevant answers and results.
4. Sustainability labels are extensive; many types exist, with many differences and nuances. Merging all of them into one imitation label can be reductive and oversimplify possible effects (sourcing, packaging, animal welfare, organic, carbon neutral...).
5. The discrete choice experiment could have been designed to be more realistic to replicate better an online grocery shopping experience and therefore get genuine choices and results from respondents.
6. Risks of response biases are frequent when administering a questionnaire. When possible, five-point Likert-scale questions were designed and used to reduce biases in the questions, but there remains the bias of extreme and non-extreme response styles (Liu et al., 2017).
7. The income of people was not included in the demographic questions section because this research did not investigate how the price could affect the equation. However, in this economic context of inflation, possible causalities/links could be interesting to investigate. Moreover, income data helps to estimate respondents' purchasing power better.
8. For product comparison, more similar product visualisations should be chosen. For example, the chocolate variation with healthiness labels was dark chocolate in a light blue package, while the regular variation without healthiness labels was milk chocolate in a light beige package. These different characteristics may have altered the results of chocolate compared to other products with more similar packaging.

7. MANAGERIAL IMPLICATIONS

1. Improving sustainability labelling strategies. Food industry managers should develop more precise and informative sustainability labelling strategies that effectively communicate their products' environmental and social benefits. By using sustainability labels on their products, companies can attract more environmentally and socially conscious consumers, positively differentiate their products in the competitive marketplace and increase their revenue.
2. Strengthen product healthiness with sustainability labelling. The study reveals the moderating effect on products with a healthy front-of-package label and a positive purchase intention increase. Managers should focus on promoting the health benefits of their products alongside sustainability attributes. By emphasising the healthiness of their products in conjunction with sustainability labels, companies can appeal to health-conscious consumers who value both aspects in their purchasing decisions and therefore grow their business.
3. Increase the range of sustainable products regardless of whether the brand is private or international. The study identifies sustainability labels as a positive purchasing intention factor for food products with private and non-private brands, which can establish a competitive edge in the market, attract new consumers and raise sales of those products.
4. Developing market-specific strategies. The study suggests potential variations in the effect of sustainability labels across different demographic and geographic segments. Managers should consider tailoring their labelling marketing strategies to specific market segments. This could involve adapting the labels to resonate with the values and preferences of different consumer groups within Europe. For example, France and Lithuania focus more on non-private label products with a sustainability label, while Norway accents both private and national brand label products with a sustainability label.
5. Evolve product-specific labelling strategies. The study also identifies that customers pay attention to different labels when purchasing from different food categories. Companies selling fruits, vegetables, dairy or protein products should focus on sustainability labels. Manufacturers of grain,

cereals, bakery, sweets and snacks products should increase assortment with healthiness labels. Private label owners should prioritise drinks, hot beverages, condiments, oils and spices to increase sales.

6. Increase awareness of labels displayed on food products. Participants from this study have moderate familiarity with researched labels. Therefore, conducting marketing campaigns to increase awareness of labels and using them together would benefit the companies greatly. The greater the consumer's knowledge or familiarity with the labels, the higher the purchase intention will be and, therefore, the higher the sales.

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APPENDIX 1. Research Survey



English (United Kingdom) ▼

Intro

Thank you for taking the time to participate in this survey!

We are two BI students writing our master's thesis about consumer behaviour and food products.

This survey will take approximately 7 minutes.
You can choose your preferred language in the top right-hand corner.

Answer the questions as honestly as you can. There are no right or wrong answers. Your responses will be anonymous.
Participation is voluntary and you have the right to withdraw from the survey at any point.

The data gathered in this survey will be analyzed collectively without identifying or looking at individual responses, and will not be passed on to third parties. By continuing, you agree to this policy.

If you have any questions, feel free to contact us at s2214162@bi.no or s2216592@bi.no.

Demographics

Where do you currently live?

- France
- Lithuania
- Norway
- Other

What gender do you identify as?

- Female
- Male
- Other

How old are you?

- <18
- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- >65

What is your current employment status?

- Employed
- Self-employed
- Unemployed
- Student
- Retired

What is your current employment status?

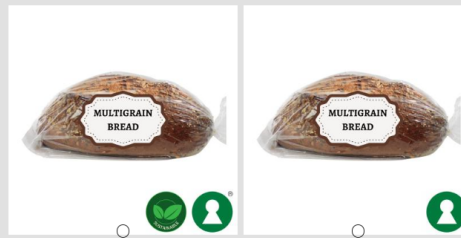
- Employed
- Self-employed
- Unemployed
- Student
- Retired

What is the highest degree or level of education you have completed?

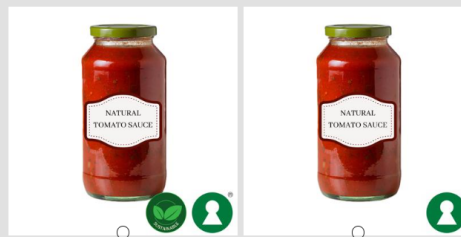
- Less than a high school diploma
- High school degree or equivalent
- Professional degree
- Bachelor's degree
- Master's degree
- PhD or higher

Comparison: SLxH vs H

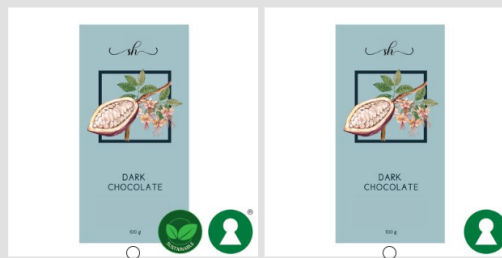
Imagine you are shopping groceries. Please indicate which one of the following two products you particularly prefer:



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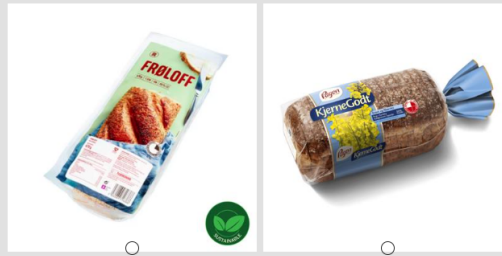


Imagine you are shopping groceries. Please indicate which one of the following two products you particularly prefer:

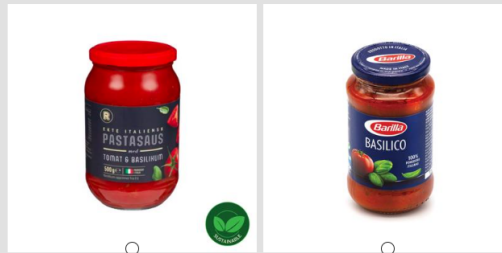


Comparison: SLPL vs nPL

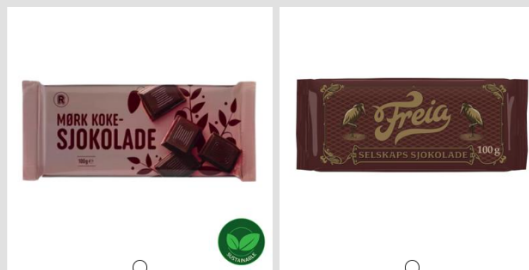
Imagine you are shopping groceries. Please indicate which one of the following two products you particularly prefer:



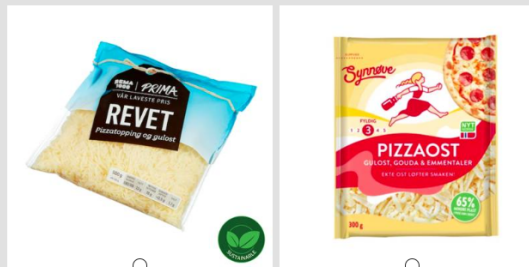
Imagine you are shopping groceries. Please indicate which one of the following two products you particularly prefer:



Imagine you are shopping groceries. Please indicate which one of the following two products you particularly prefer:



Imagine you are shopping groceries. Please indicate which one of the following two products you particularly prefer:



Purchase intentions

You're going to be asked questions about labels, here are some definitions in case you don't know their meaning:

- Sustainability label - informs about the environmental and social impacts of producing or using a product.
- Healthiness label - identifies healthier food products within a product group. Usually, the product with this label meets criteria such as less fat, less sugar, less salt, or more fiber.
- Private brand label - products sold by a retail store where the store either displays its own name or retailer-created brand name.

How familiar are you with:

	Not familiar at all	Slightly familiar	Moderately familiar	Very familiar	Extremely familiar
sustainability labels	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
healthiness labels	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
private brand labels	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How likely are you to purchase food products with:

	Extremely unlikely	Unlikely	Neither likely nor unlikely	Likely	Extremely likely
sustainability labels	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
healthiness labels	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
private brand labels	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How important are the following labels when deciding which food products to purchase:

	Not important at all	Somewhat important	Neutral	Important	Very important
sustainability labels	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
healthiness labels	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
private brand labels	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What kind of food products do you usually buy with the following labels:

	Fruits & Vegetables	Grains, Cereals & Bakery	Dairy products	Sweets & Snacks	Protein products (meat, egg, fish, tofu)	Drinks & Hot beverages	Condiments, Oils & Spices	Other
sustainability labels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
healthiness labels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
private brand labels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How much do you agree with the following statements?

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Healthiness labels provide important information about the nutritional value of food products.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sustainability labels provide important information about the environmental and social impact of food products.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Private-label food products are more affordable than branded products.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sustainability labels are more relevant for branded food products, than for private-label products.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sustainability labels are important for all food products, not just branded ones.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Healthy food products are more likely to have sustainability labels compared to unhealthy products.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food products with sustainability labels are more likely to be of higher quality.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
All healthier food products should have healthiness labels to be considered healthy to use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food products can still be sustainable, even without sustainability labels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

