ORGANIC TARGETS 4EU

TRANSFORMATION SCENARIOS FOR BOOSTING ORGANIC FARMING AND ORGANIC AQUACULTURE TOWARDS THE FARM-TO-FORK TARGETS

Deliverable D4.1

Report on Assortment Change and Active Marketing Effects on Demand Pattern

REPORT/PUBLIC

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Contents

Tables

Figures

Summary

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AUTHOR(S)	Darius-Aurel Frank (AU/MAPP) Jessica Aschemann-Witzel (AU/MAPP) Raffaele Zanoli (UNIVPM) Emilia Cubero Dudinskaya (UNIVPM) Simona Naspetti (UNIVPM)
CONTRIBUTOR(S)	George Tsalis (AU/MAPP) John Thøgersen (AU/MAPP) Sigrid Østergaard (AU/MAPP)
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Executive Summary

This research aligns with the European Union's Farm to Fork Strategy by investigating effective marketing strategies to stimulate consumer demand for organic products. With the EU aims to transition 25% of agricultural land to organic production by 2030, influencing consumer purchasing behaviour is as crucial as expanding organic farming itself. The study examines four key marketing interventions, information labels, social norm nudges, assortment changes, and brand strategy adjustments, through a realistic online supermarket experiment that mirror near real world shopping conditions.

This report reveals that information labels, particularly a potential "EU Climate Label," are unlikely to deter consumers from choosing organic products but promote their appeal. That is, when organic products carried the hypothetical new climate label consumers were more likely to pick them up in the supermarket experiments. These findings support the idea that sustainability initiatives may work in harmony rather than conflict the Farm to Fork Strategy.

Exposure to social norm cues in organic purchasing decisions, intended to leverage societal behaviours and expectations, yielded mixed results. This research does not provide conclusive evidence supporting the sustained effectiveness of social norms cues in promoting organic buying behaviour over time. Instead, social norms appear to function primary as intermediate drivers of behaviour change, suggesting at most the potential of being integrated into broader marketing strategies that aim to resonate with societal values and cultural contexts.

Assortment adjustments emerge as an effective strategy for influencing consumer organic buying behaviour. Increasing the variety of available organic product options significantly boosts their selection by consumers. Notably, when the organic assortment increased to matching that of conventional products, consumers responded with a 45% increase in organic product purchases, despite facing a typical price markup of around 20-50%. This demonstrates that when consumers are presented with a wider range of organic products, they are more likely to find options that appeal to them and are willing to make purchase. Hence, retailers are encouraged to expand organic assortments to make organic options more accessible.

Brand strategy changes, particularly the use of private label premium branding over conventional private-label budget or conventional premium branding, is another strategy which tested effective in driving consumers' organic product purchases. The results suggest that premium branding cues effectively reinforce consumer confidence, especially in markets where price premiums might otherwise deter purchases. By aligning private label brand strategies with premium branding cues, retailers have the power to enhance the perceived value of organic product alternatives and differentiate them from conventionally branded alternatives.

In conclusion, this report underscores the pivotal role of marketing strategies in promoting organic consumption. By integrating strategic marketing elements such as informational cues, optimised product assortments, and refined brand strategies, stakeholders can effectively increase consumer choices of organic products in supermarket settings. However, coordinated efforts among policymakers, retailers, and marketers will be key in designing interventions that not only exploit short-term organic purchases but align with the EU's broader sustainability goals, contributing to the successful realisation of the EU's organic farming objectives by 2030.

1. Introduction

The European Union's Farm to Fork Strategy aims to reach 25% of agricultural land under organic and a significant increase in organic aquaculture by 2030, reflecting the EU's commitment to promoting sustainable agricultural practices. However, achieving this target depends not only on expanding organic production but also on stimulating consumer demand for organic products. Organic food purchasing in the EU is influenced by various factors, including price sensitivity, competing environmental claims, product assortment availability, and brand perception (Haiyan et al., 2023). Understanding these influencing factors is crucial for both policymakers and retailers seeking to encourage organic consumption.

Within Work Package 4 (WP4) Socio-economic impact on the market side, online supermarket experiments were designed to explore how marketing strategies can effectively influence consumer behaviour towards organic products. Conducted across Denmark, Italy, Germany, and Romania, the experiment aimed to investigate the effects of key marketing interventions, including information labels, social norm nudges, assortment changes, and brand strategies on consumer choices. By systematically testing these factors, the experiments provide valuable insights into how consumer preferences for organic products can be shaped and how these interventions can support the EU's sustainability goals. The Deliverable D4.1 "Report on assortment change and active marketing effects on demand pattern" describes the results of the work carried out in Task 4.1 "Piloting assortment strategies and nudges" and Task 4.2 "Testing upscaling of assortment change and active marketing."

The online supermarket experiments provided a comprehensive exploration of how marketing strategies ranging from information labels and social norms nudging to assortment changes and brand strategies affect consumer behaviour toward organic products. By conducting these experiments across four EU countries, the study contributes valuable insights into how retailers and policymakers can design interventions that support the EU's goal of increasing organic consumption. The findings highlight the importance of thoughtful marketing strategies that balance environmental claims, leverage social influence, optimise product assortment, and build strong brand identities to drive sustainable consumer behaviour across Europe.

2. Marketing Strategies

Marketing plays a critical role in shaping consumer behaviour, not least in food retailing, where choices are influenced by various external factors. In the context of organic products, marketing strategies such as labelling, social nudges, product assortment, and brand positioning are commonly used for driving consumer demand (e.g., Martinho, 2020). The present research employed online supermarket experiments focused on learning how these strategies impact consumers' willingness to choose organic products over non-organic alternatives.

2.1. Information Labels

Information labels are a powerful tool for influencing consumer decisions, particularly when it comes to sustainability (Choisdealbha & Lunn, 2020; Majer et al., 2022; Thøgersen et al., 2025). In the EU, the EU organic label and national organic labels signal ecological and environmental related benefits. However, the introduction of additional sustainability labels such as climate or carbon-footprint labels could potentially confuse or shift consumer attention away from organic products. Therefore, this study explores the interaction between the EU organic label and a hypothetical future "EU climate label" to assess how the presence of such a climate label might influence the likelihood of choosing organic products.

Building on existing research (e.g., Zander et al., 2015; Santos & Gonçalves, 2021), it was expected that an EU climate label could compete with the EU organic label, leading consumers to prioritise climate related attributes over organic farming practices. Therefore, research is needed to increase the understanding of how to balance multiple environmental claims on product packaging, ensuring that organic products maintain their appeal while addressing broader sustainability goals.

2.2. Social Norms Nudging

Social norms nudging is a behavioural strategy that leverages the influence of perceived societal behaviours and expectations to guide individual choices (Ling et al., 2023). Both descriptive norms (what relevant others are doing) and injunctive norms (what relevant others approve of) (Legros & Cislaghi, 2020) have been shown to have a strong impact on consumer decision-making, especially in contexts where environmental and ethical considerations are involved. In this research, descriptive social norm messages were tested to determine their interaction with organic labelling in influencing consumer product choices. It was expected that highlighting the popularity of organic products or indicating that choosing organic is socially approved would increase the likelihood of consumers aligning their behaviour with these norms. The experiment tested whether social validation reinforcing social approval of organic products could drive higher levels of organic purchasing. This approach ties into broader EU goals of fostering sustainable consumption through community-driven behavioural changes.

2.3. Assortment Changes

Product assortment plays a significant role in influencing purchasing decisions, particularly in categories such as organic food, where consumer choice may be limited by the available variety of organic products (Timonina-Farkas et al., 2020). The current research studied the effects of varying assortments of organic versus non-organic products to assess how changes in assortment affect consumer preferences. The EU's goal of increasing organic consumption depends not only on consumer willingness but also on the retail availability of organic options. The current research tested two key assumptions related to assortment changes: first, that increasing the variety of organic products available would lead to higher organic purchases, and second, that reducing the number of non-organic options would nudge consumers toward organic alternatives. By simulating a real-world shopping environment, the experiment provided insights into how retailers can adjust their product assortments to support the EU's sustainability targets and increase the visibility and selection of organic products in stores.

2.4. Brand Strategy Changes

Branding is a crucial strategic marketing element in the retail sector, influencing consumer trust, loyalty, and purchasing decisions (Lassoued & Hobbs, 2015). In the context of organic products, brand perception can significantly impact consumer choices, especially when competing against conventional products. The current study tested the effects of different brand strategies introducing premium brands, basic private-label brands, and private-label premium brands to assess their influence on consumers' organic product selection. The hypothesis was that premium brands and established private labels would be more effective in driving organic product sales compared to generic or lesser-known brands. The results of this experiment allowed for a clear understanding of how brand positioning affects consumer confidence in organic products and how branding strategies can be aligned with the EU's broader sustainability objectives. As organic products often carry higher prices, brand reputation and perceived value become essential factors in convincing consumers to make sustainable choices.

3. Methodology

3.1. Pilot Experiments

In an initial phase, AU/MAPP and UNIVPM conducted three pilot experiments (Task 4.1 Piloting assortment strategies and nudges) through online studies with consumers in Denmark, Germany, and Italy. In these experiments, the researchers tested selected psychological mechanisms and retail strategies that could drive demand for organic products at the retail stage of the value chain. The experiments were designed to address the research question: "What are the potential consumer psychological mechanisms that can drive demand in the retail stage of the value chain?" The pilot experiments evaluated the effectiveness of various interventions including informational nudges, social norm cues, and assortment changes drawing from established research in nudging, choice architecture, and behavioural economics within the organic product context. The experiments featured different organic foods including aquaculture products.

3.1.1. Experiment 1

In the first experiment, we introduced an information nudge in the form of a hypothetical climate label to examine its potential impact on consumer choices, compared to and combined with the EU organic label. The key objective was to assess whether the addition of a climate label currently under consideration for mandatory implementation in the EU could inadvertently divert attention away from organic products, thus undermining efforts to increase their market share. Climate and organic labels both signal environmentally friendly attributes, but they may compete for consumer attention, leading to confusion or prioritisation of one over the other. It was explored whether the presence of an "EU climate label" would influence choices more than the EU organic label and therefore potentially reduce the likelihood of consumers selecting organic products in the presence of non-organic products with a climate label. This stems from the concern that when presented with both climate and organic labels, consumers might prioritise climate-related attributes over organic ones, resulting in lower organic product choices.

Participants

221 Danish consumers (50% female) were recruited through panel provider Norstat.

Design

Participants were randomly assigned to one of three label conditions (Label: Organic, Pseudo Climate, Organic + Pseudo Climate; between-subjects) for each an animal-based (cheese) and a plant-based product (bananas; within-subjects). Participant's task was to choose between two alternative products, with one alternative representing the labelled product (organic, pseudo climate, both) and the other alternative being a conventional, non-labelled product.

Procedure

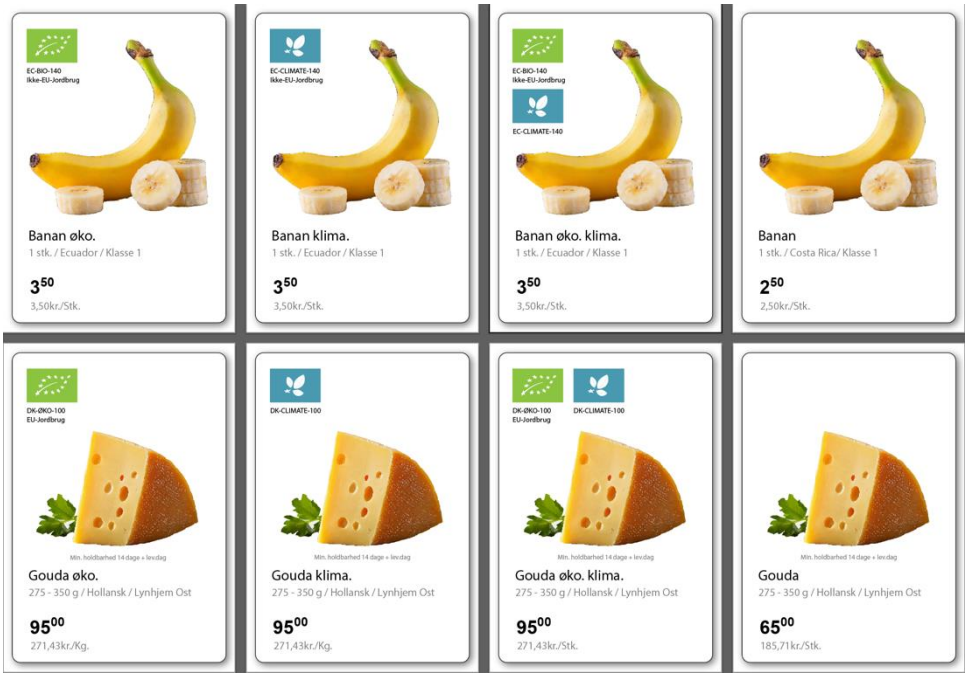
Before participants made their product choice, they read a brief explanation of the meaning of each climate and organic label, and answered three questions (about familiarity, liking, and usefulness), primarily to increase the familiarity of the unknown climate label.

This was followed by the instructions to make their selection, along with a cheap talk script reminding participants to make a realistic choice, as if they would have to pay for the product with their own money. Following this instruction, all participants were presented with a set of products and asked to choose their preferred alternative.

Stimuli

The stimuli, shown in Figure 1, depicted the combination of labels for each the bananas and cheese options. The right-most alternative was the default conventional option. Of the three alternatives on the left, one was presented alongside the conventional option (rightmost) in each choice set.

Figure 1. Stimuli of Pilot Experiment 1



Measures

The dependent measure in this study is participants' choice of the labelled product (1 = yes, 0 = no). Other measures were participants' decision confidence ("How confident were you in making the 'right' decision?"; 1 = not at all, 9 = very confident; Chan & Wang, 2018), sustainability and price fairness perception (Malc et al., 2016), importance of product information, (e.g., "I compare product information labels to decide which brand to buy"; 1 = Totally disagree, 7 = Totally agree; Scholderer et al., 2004), and the frequency of organic product shopping ("How many of the last 5 times you bought [...] did you choose organic: 0 to 5 times for the four products bananas, cheese, milk, and potatoes). Demographic questions included age and gender.

3.1.2. Experiment 2

In the second experiment, we investigated the effect of a social norm nudge, aiming to contribute to Task 4.2 by investigating its effectiveness in increasing the likelihood of consumers choosing organic products. The rationale for using a social norm nudge was rooted in the common finding that people look to others' behaviour to determine acceptable and prudent actions (Schultz et al., 2007). We investigated whether such a nudge could positively impact consumer preferences for organic products. We hypothesised that the presence (vs. absence) of a descriptive social norm for organic purchasing would increase the likelihood of consumers choosing organic over conventional products, or the product highlighted by the social norm message.

Participants

The second pilot experiment included 190 German consumers (M_{age} = 34.4 years old, SD = 33.0; 47.4% female), recruited online through the online panel provider Prolific. Of these, 57.3 percent had a university degree or equivalent education.

Design

Participants were randomly assigned into one of two conditions (Social norm: present vs. absent; between-subjects) choosing between an organic and a conventional option for each an animal-based and a plant-based product (within-subject) using a mixed design. The two product categories are farmed sea bass filets for the animal-based product, and orange juice as the plant-based product. The descriptive social norm is manipulated through a text stating, “Popular Choice”.

Procedure and Stimuli

Participants underwent a similar procedure as the one detailed in Experiment 1. Specifically, they were asked to choose between two options for both a plant-based and an animal-based product each, presented in a random order (see Figure 2). Within each choice set, one option was an organic product alternative (randomly labelled as the popular choice or not), and the other was a conventional product alternative (also with or without the popular choice label). In total, each participant made two selections: one for the plant-based product and one for the animal-based product.

Figure 2. Stimuli of Pilot Experiment 2

Measures

The primary dependent variable in this experiment is the choice of organic product. In addition to measures introduced in Experiment 1, the experiment measured participants’ perceived injunctive norm (e.g., "the label reminded me to consider what others approve of"; White & Simpson, 2013) and perceived descriptive norm (e.g., "the label reminded me to consider what others are doing"; White & Simpson, 2013). Other measures included participants' decision confidence,

sustainability attitudes, and independent and interdependent self-construal ("my personal identity, independent of others, is very important to me"; 1 = strongly disagree, 7 = strongly agree, and "it is important for me to maintain harmony within my group"; 1 = strongly disagree, 7 = strongly agree; both adapted from Singelis, 1994, and Hardin et al., 2004). Demographic questions were identical to those used in Experiment 1.

3.1.3. Experiment 3

The third experiment tests the effect of the assortment on consumers' choice of organic products. The assortment is conceptualised in a hierarchical fashion, where a customer first chooses a product assortment (e.g., what store to visit) and then the product itself (Goodman & Malkok, 2012). Our focus is on the second stage: the product. The assortment is defined as the number of available options in each product category, including two components: the number of distinct options and the number of category replicates (Kahn & Wansink, 2004).

In terms of the number of alternatives, previous research indicates that a higher number of alternatives is typically preferred (Goodman & Malkok, 2012). However, the perceived variety is influenced by the organisation of and the relative symmetry in the frequencies of items (entropy) in the assortment. Large, organised sets might generate the impression of greater variety, while smaller, organised sets will make it obvious that there are few alternatives (Kahn & Wansink, 2004).

The symmetry (entropy) or relative frequency of the assortment refers to the relative distribution of the options within the set. In symmetric assortments, the relative frequency of different options is roughly equivalent. In asymmetric assortments, the relative frequency of at least one option will dominate the other options. In our case, symmetric assortments would imply an equal proportion of organic and conventional products. In contrast, asymmetric assortments refer to assortments in which one of the product types (either organic or conventional) is present in a higher proportion.

In asymmetrical assortments, the dominant item serves as a starting point or anchor, generating a heuristic process that helps consumers appreciate variety. According to Kahn and Wansink (2004), increasing the variety in an assortment increases consumption only for asymmetric assortments. Lower variety was preferred and perceived as more fun for the symmetric assortments. Importantly, however, the structure of an assortment (e.g., organisation and symmetry or entropy) moderates the effect of actual variety on perceived variety (Kahn and Wansink, 2004).

This experiment aims to investigate the existence of a tipping point related to changes in the organic assortment. Specifically, we seek to identify a threshold where further increases in the size of the organic assortment does not result in further increase in the choice of organic products. While the present study will not analyse changes in the assortment size and the organisation, we keep in mind that these factors might affect perceived variability by consumers, so we keep them constant across the treatments.

We hypothesise that (a) organic products will be chosen more frequently in the asymmetric organic dominant assortment and furthermore that (b) organic products will be chosen more frequently in the symmetric assortment than in the asymmetric-conventional assortment.

Participants

Using a panel provider (CINT), we recruited 186 primary household shoppers (Mage = 50.4 years old, SD = 12.7; 54% female) from Italy.

Design

The present design (Figure 3) corresponds to a randomised between-subjects experiment with three treatments and two products within subjects. Participants were randomly allocated into one of the following treatments: 1) Asymmetric assortment with conventional products as dominant (25% organic, 75% conventional), 2) Symmetric assortment (50% organic, 50% conventional), 3) Asymmetric assortment with organic products as dominant (75% organic, 25% conventional). A factorial design was applied within each treatment to ensure the presence of the less dominant category (conventional or organic) at least once for each product (Goodman & Malkok, 2012). This allowed us to control for product preference bias.

Figure 3. Example of experimental design for the study

	One of the following factorial designs:			
	P* T**	P* T**	P* T**	P* T**
Asymmetric - Conventional dominant 25% organic	**P1 B** P2 C P3 C P4 C None	P1 C **P2 B** P3 C P4 C None	P1 C P2 C **P3 B** P4 C None	P1 C P2 C P3 C **P4 B** None
	One of the following factorial designs:			
	P* T**	P* T**		
Symmetric 50% organic	**P1 B** **P2 B** P3 C P4 C None	P1 C P2 C **P3 B** **P4 B** None		
	One of the following factorial designs:			
	P* T**	P* T**	P* T**	P* T**
Asymmetric - Organic dominant 75% organic	P1 C **P2 B** **P3 B** **P4 B** None	**P1 B** P2 C **P3 B** **P4 B** None	**P1 B** **P2 B** P3 C **P4 B** None	**P1 B** **P2 B** **P3 B** P4 C None

*P --> Product. Indicated with a "P" and a number, representing a product. For example: P1 = Orange Juice, P2 = Apple Juice, P3 = Tomato juice, P4 = Cranberry juice. (The flavours and products can be disucssed further on. The important is that is the same product category, for simplicity reasons).
**T --> Type of production (C = Conventional, B = Bio/Organic). In the assymetric condictions, each product has to appear at least once in the non-dominant position (25%), that is why a factorial design is needed withnin the respondents, to control for product preferences.

Procedure

Participants were introduced into the experiment and randomly allocated to their corresponding treatment. Within the treatment, a set of plant-based or animal-based product alternatives was randomly displayed to the participants. The subjects were required to choose the product of their preference or a "none" alternative. In the latter case, participants were asked a closed single-choice question about the possible motive for selecting the "none" alternative. Among the reasons displayed to the participants, the option "The product I prefer was not available as organic" was presented, along with other reasons unrelated to the argument (e.g., allergies, dislike of the products, etc.). Participants who selected a product were asked to evaluate the perceived variety of the choices and how likely they were to choose an online shop that offers these alternatives to buy these products. All participants were also exposed to a manipulation check to guarantee the effectiveness of treatment. Then, the procedure was repeated for the other product type (plant or animal based).

Stimuli

The animal-based product category was yogurt (Figure 4), while the plant-based product was pasta (Figure 5). Both cases typically offer a large assortment of conventional products.

Figure 4. Example for yogurt

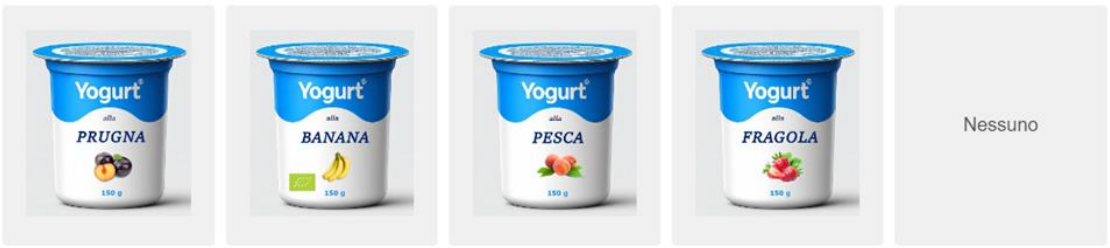


Figure 5. Example for pasta

Measures

Three dependent variables were used. The first one is the choice of an organic product (binary). The second one is the perceived variety of the bundle of products (3 items, Cronbach's αYogurt = 0.87, αPasta = 0.85) (Kahn & Wansink, 2004). Third, the likeliness that the respondent, in the future, would like to buy from an online shop that presents this category of products with this assortment (Likert scale 1-7). In addition to the measures described above, participants were asked to rate their variety-seeking behaviour (7 items, α = 0.89) (Van Trijp & Steenkamp, 1992) and their organic food consumption frequency by a categorial question. Respondents who declared that they had bought all selected products as organic at least once in the last five times they bought them were considered regular organic consumers, while those who bought at least one of the products as organic were identified as partial organic consumers. Respondents who had never bought organic products were considered to be non-organic consumers. Furthermore,

a manipulation check question ("How would you rate the variety of organic product options available in the selection presented to you? 1 = severely limited, 7 = completely unrestricted) was answered.

3.2. Online Supermarket Experiment

The online supermarket experiment was a cross-country study conducted in Denmark, Italy, Germany, and Romania that simulated shopping behaviour in an experimental setting. The study aimed to analyse the effects of two key factors on organic food product choices over time: (1) supply-based assortment and brand strategy changes, and (2) nudges and alterations in the choice context. In addition to traditional organic products, organic aquaculture products were included in the online supermarket.

This study draws on findings from the scenarios developed in WP2 "Participatory foresight and scenario analysis", in particular Scenario 4 "Organic Power to the People", according to which organic demand remains private and individuals express a preference for healthy and green alternatives amidst a negative, rebellious situation. This scenario assumes that the organic market is influenced by retail chains, and consumers purchase organic products online. The scenario sees a trend of a growing number of people embracing organic farming as a reaction, fostering a widespread and uniform conversion for both livestock and arable vegetable crops. This further strengthens the demands for organic sustainability, highlighting consumers' growing emphasis on environmentally conscious and health-centric choices.

Approximately 300 consumers from various segments in each country participated, repeatedly "shopping" in the online supermarket under selected manipulations—some of which were tested in Task 4.1 across different product categories. The sample was representative of each country's population in terms of age, education, and gender.

3.2.1. Data Collection

Consumers from four European countries—Denmark, Italy, Romania, and Germany—participated in the online supermarket experiment (see Table 1). The targeted sample size was 300 unique primary household shoppers from each country in wave 3. Recruitment was conducted through the market research agency Norstat in three waves between September 2024 and November 2024:

- Wave 1
- Wave 2 (2 weeks after Wave 1)
- Wave 3 (6 weeks after Wave 1)

To account for attrition, Waves 1 and 2 were oversampled, anticipating a drop-off rate of approximately 50–60% between waves. The total number of interviews conducted across the data collection period is summarised in Table 1.

Table 1. Total number of interviews

	Denmark	Germany	Italy	Romania	Total
Wave 1	845	903	777	804	**3329**
Wave 2	338	491	469	277	**1575**
Wave 3	290	410	430	199	**1329**
Total	**1473**	**1762**	**1676**	**1280**	**6233**

Notes: Consumers (18+ years) representative of each country (age, gender, education); LOI = 15 min.

In addition to monetary compensation, participants were incentivised to make realistic shopping trips as a few of them would be offered by random draw to receive their online shopping basket delivered to their home upon completion of the final wave of the study. This offer was, however, converted into a voucher for logistical reasons.

3.2.2. Sample Characteristics

The final sample consisted of 1038 unique participants ($n_{Denmark}$ = 233, $n_{Germany}$ = 354, n_{Italy} = 319, $n_{Romania}$ = 132) who participated in and successfully completed the interviews of all three waves.

This sample featured consumers with mean ages ranging from 47,2 years in Italy to 53,8 years in Germany. Gender distribution was balanced across all countries, with a slight majority of females, except in Romania where male representation was marginally higher and Denmark where male representation was larger. Educational attainment varied, with the highest percentage of participants in Italy holding professional degrees (55,8%), while Romania had the largest proportion of bachelor's degree holders (40,9%). Financial situations were mostly reported as normal or average, with Italy (64,3%) and Romania (63,6%) having the highest percentages, while Denmark (30,9%) and Germany (24,3%) saw the highest percentages of participants reporting their financial situation as being well. Most participants—around three quarters—identified as the primary household shoppers across the four countries. Food allergies were uncommon, with over 85 percent of participants in each country reporting no allergies. Regarding eating habits, most participants were omnivores, particularly in Denmark (72,5%), while Germany had the highest proportion of flexitarians (46,0%). A small percentage of the sample identified as vegan, vegetarian, or pescetarian, with the highest occurrence observed in Germany (8,2%). Table 2 summarises the demographic characteristics of the final sample.

Table 2. Sample characteristics

		Denmark (n = 233)	Germany (n = 354)	Italy (n = 319)	Romania (n = 132)
Age	Mean (SD), in years	52,2 (16,3)	53,8 (14,1)	47,2 (10,2)	52,3 (14,2)
Gender	Female, %	43,8	50,8	53,9	49,2
	Male, %	56,2	49,2	46,1	50,8
Education	Primary school, %	5,6	9,0	0,6	2,3
	High school, %	9,9	37,3	6,9	10,6
	Professional Degree, %	29,6	21,5	55,8	27,3
	Bachelor, %	28,3	10,7	8,8	40,9
	Master, %	26,6	21,5	27,9	18,9
Financial situation	Difficult, %	2,6	7,6	6,0	3,8
	Modest, %	19,3	27,1	24,1	26,4
	Normal/Average, %	47,2	41,0	64,3	63,6
	Well, %	30,9	24,3	5,6	6,8
Primary Household Shopper	Yes*, %	74,2	85,6	85,9	87,9
Food allergies	No, %	86,9	90,6	92,1	92,3
Eating Habit	Omnivore, %	72,5	45,8	66,8	69,7
	Flexitarian, %	25,3	46,0	29,5	26,5
	Vegan/ Vegetarian/ Pescetarian, %	2,1	8,2	3,8	3,8

Notes: *Participants responding “always” or “most of the time” on a 5-point scale related to the question “how often do you buy groceries for your household”.

3.2.3. Design

The online supermarket experiment used a repeated-measures within-subject design, where participants were exposed to five different conditions (in a randomised order), repeated at three different timepoints. The three waves represented repeated shopping trips to the online supermarket, allowing the experiment to test the reliability of the intervention effects and participants' responses to changes in assortment and brand strategy over time.

Manipulations

The five conditions included a control, an information nudge, a social norm nudge, an assortment change, and a brand strategy change (for an overview, see Table 3).

The control was the baseline shopping setting in which participants would merely shop for alternatives of which one out of the options was an organic labelled product. The information nudge manipulation was a variation of the control shopping setting, in which a different product also featured an “EU climate label”. The social norm nudge manipulation was a different variation

of the control shopping setting, in which a randomly selected product within the category featured a "preferred choice" label. The product assortment change manipulation was a variation of the control setting in which an increasing share of organic products within the product category was presented during the second wave and third waves. In the second wave, the share of organic products available increased to 50%, whereas in the final wave the share increased to 75%. The brand strategy change manipulation represented a variation of the control setting in which gradually first a private label basic brand (wave 2) and second a private label premium brand (wave 3) was introduced to the product category that otherwise only contained a single premium brand amongst the four available options. This approach ensures that the private label basic brand is compared to a premium competitor brand to make choice setting realistic. As perceptions of private label brands were expected to differ across countries and private label brands may not necessarily be the cheapest option, the implementation included a private-premium label brand in the final wave. The three different brands are communicated through labels assigned to products, e.g., "Premium Brand", "[Storename] Basic", and "[Storename] Premium". Moreover, private label premium is programmed so that basic is always cheaper than premium private.

Table 3 Overview of manipulations

	Manipulations				
	Control	Information nudge	Social norm nudge	Assortment change	Brand strategy change
Product					
Plant-based	Random (1 of 5)	Random (1 of 5)	Random (1 of 5)	Random (1 of 5)	Random (1 of 5)
Animal-based	Random (1 of 5)	Random (1 of 5)	Random (1 of 5)	Random (1 of 5)	Random (1 of 5)
Order					
Fixed	First				
Random		Second-Last	Second-Last	Second-Last	Second-Last
Wave					
1	Present	Present	Present	Limited Organic	Premium
2	Present	Present	Present	Full Organic and non-organic	Premium and Private-Basic
3	Present	Present	Present	Limited Non-Organic	Premium, Private-Basic, and Private-Premium

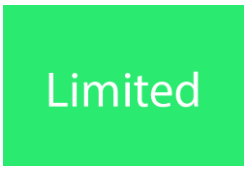
Stimuli

All stimuli used in the experiment, except for the official EU organic logo, were designed by the research team. Product images were created using Adobe Firefly, a generative AI tool specifically designed for professional image generation and manipulation.

In the experiment, six labels (and two "decoy" labels) were used to enhance the respective manipulations (see Table 4). The EU Organic Label indicated products meeting the European

Union's organic certification standards, emphasising environmentally friendly production methods. The "EU" Climate Label, created to mimic an official EU certification, represented climate-conscious practices. The Social Norm label displayed "Bestseller," serving as a descriptive norm that signals the products' popularity and encourages consumers to align their purchasing decisions with perceived societal preferences. Additionally, the Premium Brand label signified high-quality, luxury products, while the Private-Label Premium label represented superior products under a retailer's own brand. In contrast, the Private-Label Basic label targeted budget-conscious consumers with affordable, no-frills options. Two decoy labels were also included, not as part of the main experimental focus, but solely to detect whether participants paid attention to the labelling.

Table 4. Overview of labels used in supermarket experiment

Labels			
EU organic label	"EU" climate label	Social norm nudge label	Premium brand label
			
Private-label premium brand label	Private-label basic brand label	Decoy label 1	Decoy label 2
			

All information- and image-based manipulations (e.g., climate labels, organic labels, popular choice labels, and private brand labels) were consistently placed below the "add to cart" button in the product preview. To ensure the manipulations were effective, all other product details—such as image size, appeal, and background—were standardised, with only raw foods shown without packaging.

Pricing

The online supermarket experiment employed a token-based pricing system to minimise potential biases stemming from participants' price memories of real-world products. By using tokens, the experiment avoids the influence of pre-existing price knowledge and encourages more neutral decision-making. At checkout, participants are asked to estimate how much they would be willing to spend in their local currency for the items in their shopping cart. This step converts the token values into participants' willingness to pay in real-world terms, providing a measure of how much they would spend in their local currency. This approach ensured that price sensitivity is captured while still maintaining the experiment's controlled environment.

Token prices were designed to reflect typical market markups for organic products in Europe, evenly distributed across plant- and animal-based products (for an overview, see Table 5). Organic versions of plant-based products, including bananas, orange juice, pasta, and coffee beans, had markups between 20% and 50%, with bananas and orange juice showing the highest at 50%. For animal-based products, pork, salmon, cheese, and trout had markups between 20%

and 25%, with yogurt showing a 50% markup. These price differences were intended to simulate realistic shopping choices in the experiment.

Table 5. List of product token prices

Product	Product			Avg. Markup
	Quantity	Conventional	Organic	Markup
Plant-based				
Banana	1 Pc	2 Token	3 Token	**50%**
Orange juice	1 L	3–5 Token	5–7 Token	**50%**
Pasta	500 g	3 Token	4 Token	**33%**
Coffee beans	500 g	18–22 Token	22–26 Token	**20%**
Patties	2 Pcs	16 Token	20 Token	**25%**
Animal-based				
Pork	250 g	10–14 Token	13–17 Token	**25%**
Salmon filet	150 g	12–14 Token	16–18 Token	**20%**
Yoghurt	150 g	2 Token	3 Token	**50%**
Cheese	175 g	8 Token	10 Token	**25%**
Trout filet	2 Pcs	14 Token	17 Token	**20%**

Shopping cart calculations, summarised in Table 6, were made for both plant-based and animal-based product categories, comparing the costs of conventional, organic, and mixed product selections. For plant-based products, a fully conventional cart would cost an average of 48 tokens, while an all-organic cart cost 60 tokens, with a mixed cart averaging 54 tokens. For animal-based products, a conventional cart averaged 52 tokens, and an all-organic cart cost 65 tokens, with a mixed cart costing 58.5 tokens. The total cost for a shopping cart combining both plant-based and animal-based products was 100 tokens for all conventional items, 125 tokens for all organic items, and 112.5 tokens for a mixed cart. These prices were used to calculate the maximum shopping budget of 100 tokens, while also confirming that the store's pricing structure was balanced overall and reflected a realistic markup for organic products.

Table 6. Average calculated shopping cart

Product category	Shopping cart		Mixed
	All conventional (min–max)	All organic (min–max)	
Plant-based	48 Token (42–48)	60 Token (54–60)	54 Token
Animal-based	52 Token (46–52)	65 Token (59–65)	58.5 Token
Total	100 Token	125 Token	112.5 Token

Notes: Based on maximum product quantities (one per category).

Products

An overview of the list of products and their variants in the store is shown in Table 7. For bananas, the point of variation is the country of origin (Ecuador, Costa Rica, or Indonesia), with each priced at 2 to 3 tokens per piece. Orange juice variations are distinguished by type (fresh, bottled, or concentrate) and range in price from 3 to 7 tokens per litre. Pasta is offered in different forms (penne, fusilli, or rigatoni) with a consistent price of 3 to 4 tokens per 500g. Coffee beans are categorised by roast level (light, medium, or dark), with prices increasing from 18 to 26 tokens per 500 g as the roast darkens. Finally, patties are differentiated by their plant-based ingredients (soy, wheat, or beetroot), all priced at 16 to 20 tokens per 2-piece serving.

On the animal-based products side, various parts or forms of chicken (wings, nuggets, or breasts) were available, with prices ranging from 10 to 17 tokens per 250 g, depending on the cut. Salmon filets are categorised by origin sea (North Sea, Atlantic, or Pacific), with prices between 12 and 18 tokens per 150 g, reflecting the geographical source of the fish. Yogurt is offered in different fruit flavours (banana, strawberry, or peach) at 2 to 3 tokens per 150 g. Cheese selections include Emmenthal, Feta, and Brie, each priced at 8 to 10 tokens per 175 g, while canned tuna is available in different liquid bases (olive oil, sunflower oil, or brine), priced at 14 to 17 tokens per 125 g.

These variations in products provide multiple points of differentiation, such as country of origin, product type, form, taste, or packaging. This detailed list of product attributes, along with the associated prices, offers a thorough foundation for analysing consumer preferences and spending behaviour in the context of the study.

Table 7. List of products, token prices and source of difference

Product category	Product Variant 1 / 4	Variant 2 / 5	Variant 3 / 6	Variation
				Plant-based
Banana	 Ecuador (1 Pc) 2 / 3 Token	 Costa Rica (1 Pc) 2 / 3 Token	 Indonesia (1 Pc) 2 / 3 Token	Country
Orange Juice	 Fresh (1L) 5 / 7 Token	 Bottled (1L) 4 / 6 Token	 Concentrate (1L) 3 / 5 Token	Type
Pasta	 Penne (500g)	 Fusilli (500g)	 Rigatoni (500g)	Form

Product category	Product Variant 1 / 4	Variant 2 / 5	Variant 3 / 6	Variation
	3 / 4 Token	3 / 4 Token	3 / 4 Token	
Coffee beans	 Light (500g) 18 / 22 Token	 Medium (500g) 20 / 24 Token	 Dark (500g) 22 / 26 Token	Taste (Roast)
Patties	 Soy (2 Pcs) 16 / 20 Token	 Wheat (2 Pcs) 16 / 20 Token	 Beetroot (2 Pcs) 16 / 20 Token	Basis
				Animal-based
Chicken	 Wings (250g) 12 / 15 Token	 Nuggets (250g) 10 / 13 Token	 Breasts (250g) 14 / 17 Token	Form
Salmon filet	 Northsea (150g) 14 / 18 Token	 Atlantic (150g) 13 / 17 Token	 Pacific (150g) 12 / 16 Token	Sea
Yogurt	 Banana (150g) 2 / 3 Token	 Strawberry (150g) 2 / 3 Token	 Peach (150g) 2 / 3 Token	Fruit
Cheese	 Emmenthal (175g) 8 / 10 Token	 Feta (175g) 8 / 10 Token	 Brie (175g) 8 / 10 Token	Type

Product category	Product Variant 1 / 4	Variant 2 / 5	Variant 3 / 6	Variation
Canned Tuna	 Olive Oil (125g) 14 / 17 Token	 Sunflower Oil (125g) 14 / 17 Token	 Brine (125g) 14 / 17 Token	Basis

Notes: Variants 4, 5 and 6 represent organic versions of the depicted products. The markup for organic variants ranges from 20 to 50 percent.

3.2.4. Procedure

The experiment consisted of three stages. First, participants were asked to give consent, were briefed and onboarded, and answered demographic questions. Next, participants visited the online store and were instructed to perform their weekly grocery shopping to the best of their ability (given the limited number of products). Participants were given a budget of 100 tokens, with a minimum spending requirement of 25 tokens. This minimum was explained to participants as the threshold needed to qualify for free delivery, encouraging them to make a wide selection while simulating a realistic online shopping experience. Finally, after confirming their shopping basket, participants were sent to a post-experience questionnaire, in which they answered various questions about their perceptions of the store, logos, and assortments.

3.2.5. Measures

The experiment employed a variety of behavioural measures to capture different aspects of consumer decision-making. The key metric was the share of organic products bought, which tracked the proportion of organic items selected by participants, reflecting their preference for organic options. The amount spent (in tokens) was recorded across multiple dimensions—wave, category, and product—providing insight into participants' spending behaviour at different levels. Additionally, the time spent until a product was added to the cart measured how long participants took to make individual product decisions, while overall time spent was tracked across waves and categories to assess participants' engagement and deliberation during the shopping experience. Finally, the shopping cart list captured the final set of products chosen, documenting actual purchasing decisions.

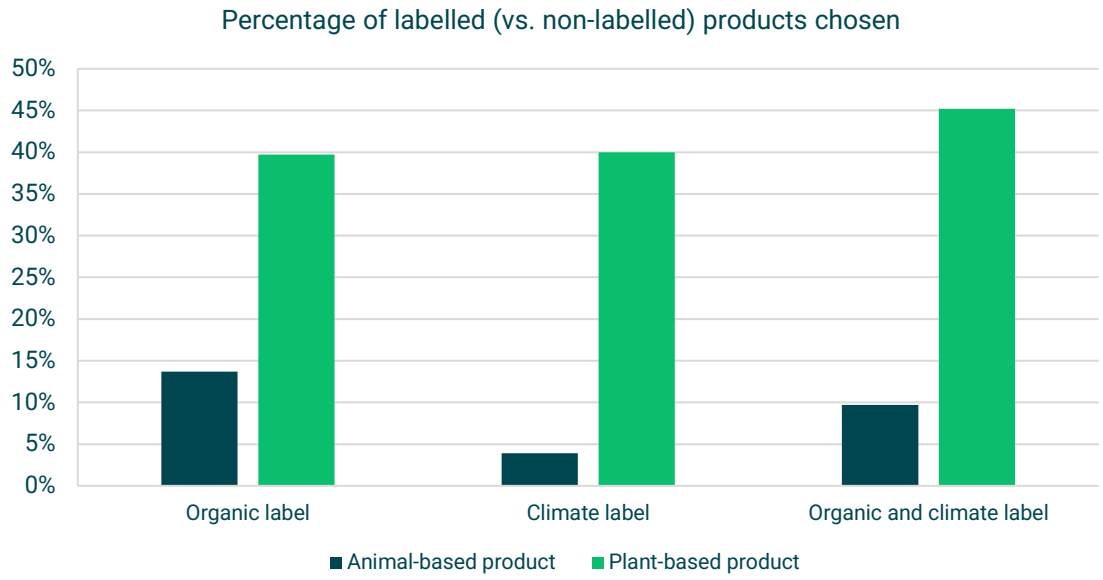
4. Results

4.1. Pilot Experiments

4.1.1. Experiment 1

The results of the first pilot experiment, shown in Figure 6, present the selection rates of labelled versus non-labelled products under three labelling conditions: Organic label, Climate label (hypothetical), and a combination of both labels. For animal-based products, in 13.7% of the cases labelled were chosen when labelled organic, dropping to 3.9% with a climate label alone, and to 9.7% when both labels were applied. Plant-based products showed considerably higher selection of labelled across all labelling conditions, with 39.7% under the Organic label alone, 40.0% with the Climate label alone, and increasing to 45.2% when both labels were present.

Figure 6. Percentage of labelled products chosen



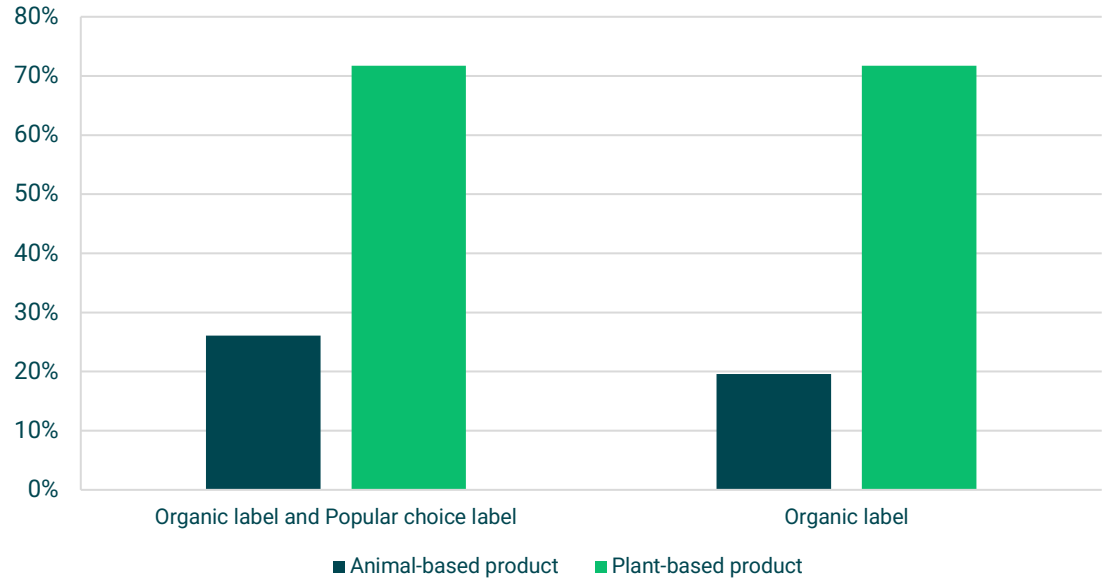
Subsequent chi-square tests reveal little to no sign of significant differences between the labelled products in terms of product choice. For plant-based products, the chi-square value of 0.58 with a p-value of 0.750 shows no statistically significant association between the labelling conditions and the selection of the differently labelled products. Similarly, for animal-based products, a chi-square value of 4.36 and a p-value of 0.113 also demonstrate a lack of significance. These results imply that the observed differences in product selection rates across different labelling conditions may be due to random variation rather than a true effect of the labels. In other words, the organic, climate, and combined labelling are equally effective at swaying consumer choices toward labelled products (relative to a non-labelled option) in both categories.

The preliminary finding of this first pilot experiment suggests that climate labelling is not more effective than organic labelling at influencing consumer food choices, but it cannot resolve if the introduction of a new EU climate label will neutralise the effect of the EU organic label. The main online supermarket experiment (see section 3.2)—which encompasses a broader range of products including seafood, involves multiple countries, and utilises larger sample sizes—will have more to say about this.

4.1.2. Experiment 2

Figure 7 shows the impact of a social norm nudge, the "Popular Choice" label, on the selection of an organic product versus a conventional non-labelled product. For animal-based products, 26.1% of participants selected the organic option when the popular choice label was present in addition to the organic label, compared to 19.6% when only the organic label was shown. In turn, for plant-based products, the organic selection rate remained consistent at 71.7% regardless of whether the popular choice label was included.

Figure 7. Percentage of labelled products chosen



Subsequent chi-square tests revealed no statistically significant associations between the labelling conditions and product choices for either category. For plant-based products, the chi-square value was 0.00 with a p-value of 1.00, indicating absolutely no relationship between the presence of the Popular Choice label and the selection of organic products. Similarly, for animal-based products, the chi-square test yielded a value of 0.56 with a p-value of 0.456, which is well above the conventional significance threshold of 0.05. Additional tests, including the continuity correction and Fisher's exact test, consistently supported these findings, confirming that the observed differences in organic selection rates are not statistically significant. This lack of significance suggests that the popular choice label, within the context of this pilot study, does not effectively influence consumer behaviour towards selecting organic animal-based products.

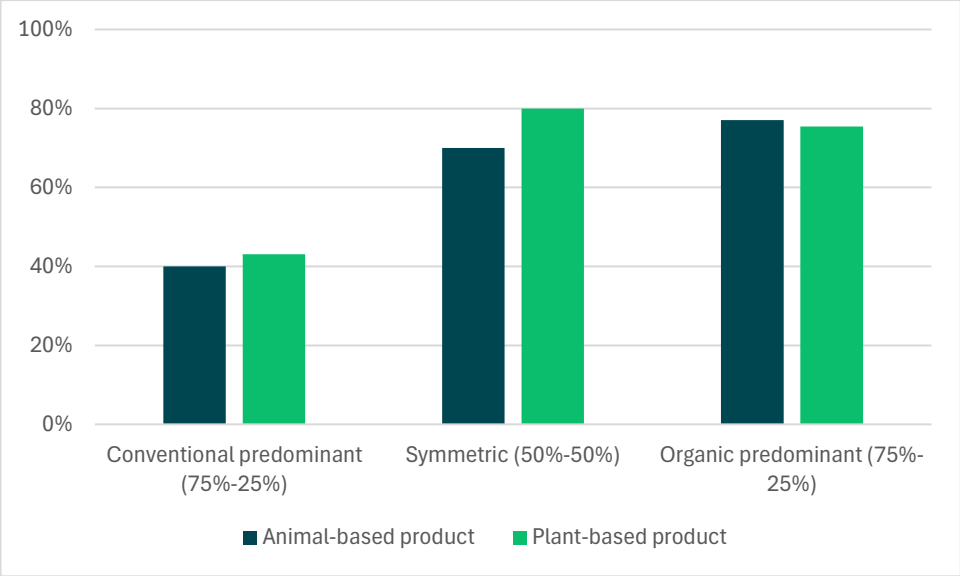
Despite these null results, the pilot experiment provided valuable insights that informed the design of the main online supermarket study. It appears unlikely from this experiment that the Popular Choice label will neutralise the effect of the EU Organic label, as no adverse interactions were observed. Moreover, the pilot highlighted areas for improvement, such as the need for a larger sample size and a more diverse range of products, including seafood. The main experiment addresses these limitations by incorporating a wider selection of products across both animal-based and plant-based categories, utilising different social norm labels and involving multiple countries to enhance the generalisability of the findings. This approach, informed by the pilot's outcomes, aims to validate and potentially strengthen the effectiveness of social norm nudges in promoting organic product selection, ultimately supporting more sustainable consumer behaviour.

4.1.3. Experiment 3

The third and final pilot experiment exposed participants to three different treatment conditions: Conventional Predominant (75%-25% conventional-organic), Symmetric (50%-50%), and Organic Predominant (75%-25% organic-conventional). Descriptive statistics indicated no significant differences between treatment conditions regarding organic consumption frequency ($\chi^2(4, N = 186) = 2.7$, $p = .610$), gender ($\chi^2(2, N = 186) = 4.49$, $p = .106$), or age ($\chi^2(10, N = 186) = 10.62$, $p = .388$). Moreover, the manipulation check confirmed that the treatments effectively influenced participants' perceptions of the product assortments, with significant differences observed for both yogurt ($F(2, 179) = 40.08$, $p < .001$) and pasta ($F(2, 180) = 47.20$, $p < .001$).

Regarding the treatment, the results illustrated in Figure 8 show significant differences between the number of selected organic products by treatments for both products, yogurt ($\chi^2(2, N = 186) = 20.81, p = .000$) and pasta ($\chi^2(2, N = 186) = 22.72, p = .000$). Specifically, for animal-based (yogurt) and plant-based products (pasta), organic products were selected more frequently when they were also more available (in the symmetric 50%-50% and organic predominant 75%-25% treatment).

Figure 8. Percentage of products selected as organic by treatment and type of product



Despite the significant increase in organic product selection, the treatments did not significantly affect participants' perceived variety of the product assortment for either yogurt ($F(2, 183) = 0.49, p = .613$) or pasta ($F(2, 183) = 0.09, p = .911$). This suggests that changes in the proportion of organic products did not alter the overall perception of variety, potentially due to the constant organisation and entropy across treatments as per Kahn and Wansink (2004). Additionally, respondents' likelihood of returning to the same supermarket in the future did not differ significantly across treatments, neither for yogurt ($F(2, 183) = 0.27, p = .766$) or for pasta ($F(2, 183) = 0.94, p = .393$). Most respondents considered it unlikely to choose a supermarket that presented the same assortment. This result was more evident in the case of yogurt (Figure 9), probably affected by the low number of choices kept fixed across the experiment. The only exception was for pasta (
Figure 10) in the symmetric treatment, in which 42% of respondents declared their willingness to return to the same shop to buy pasta.

Figure 9. Likeliness to shop in the future in a supermarket with the presented assortment of yogurt, in percentage by treatment

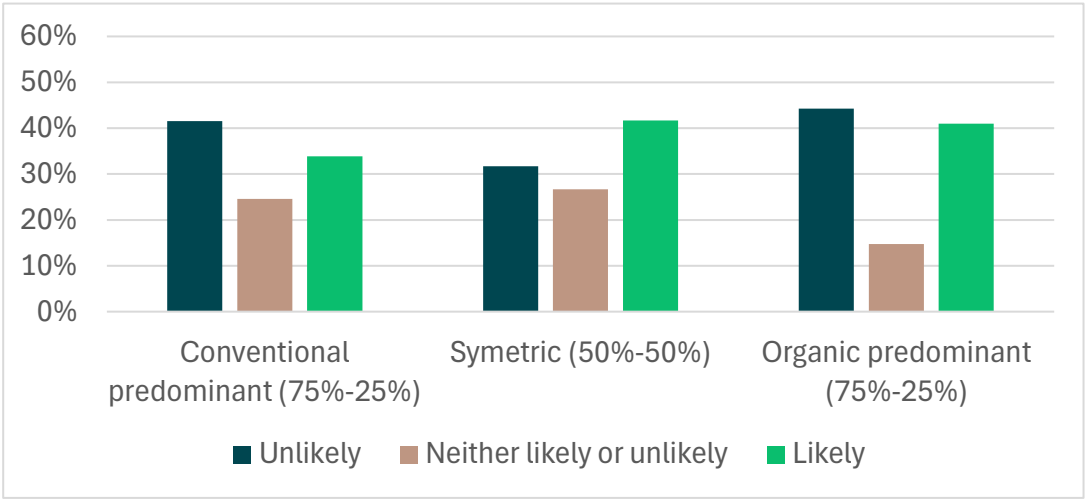
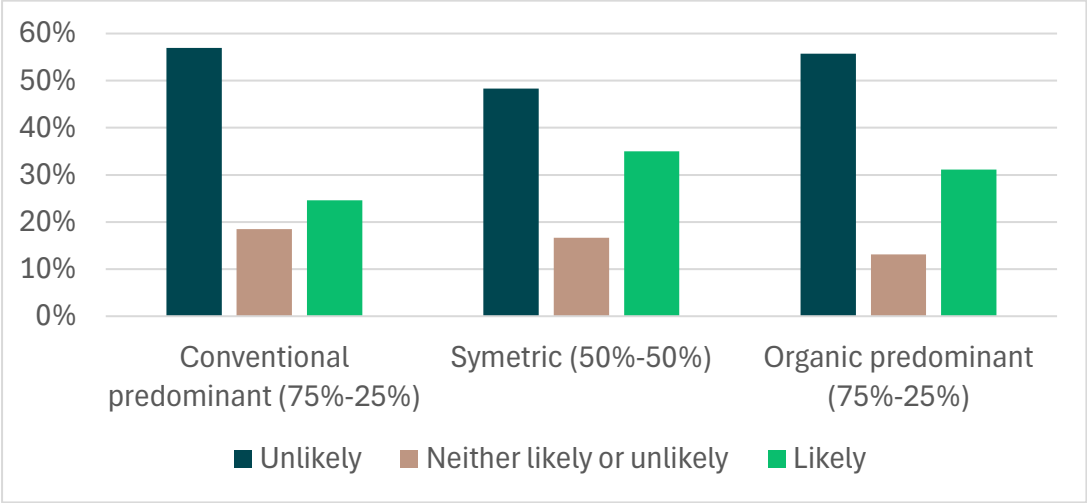


Figure 10. Likeliness to shop in the future in a supermarket with the presented assortment of pasta, in percentage by treatment



When participants were presented with the different animal-based and plant-based products, 94.6% chose a yogurt and 97.8% selected a pasta alternative. When participants opted out of selecting a product, the primary reasons were related to the unavailability of preferred flavours or formats (yogurt: 2.7%, pasta: 1.6%). Other minor reasons included the lack of their favourite brand presence or the organic certification on their favourite product flavour or format.

4.2. Online Supermarket Experiment

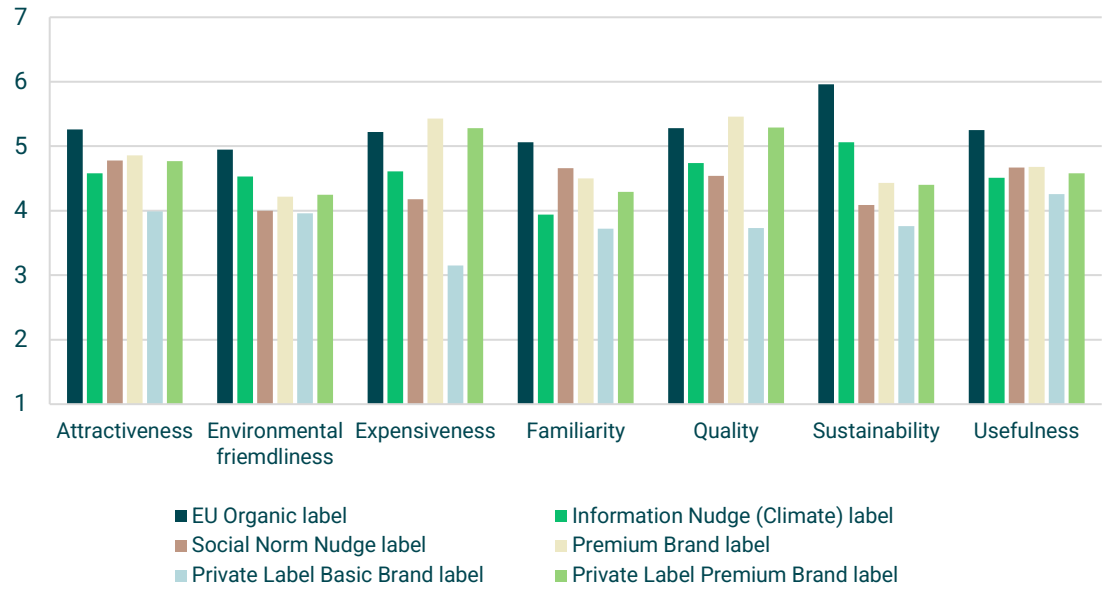
4.2.1. Perceptions of Product Labels

The following results reflect participants' perceptions of the different labels used for the marketing strategy interventions: Climate label (used for the information nudge), Social Norm label, and the Premium Brand label, Private Label Basic Brand label, and Private Label Premium Brand label (used for brand strategy change manipulation). The labels, including the EU organic label, were rated by participants after the shopping trip on scales indicating their attractiveness,

environmental friendliness, expensiveness, familiarity, quality, sustainability, and usefulness. Participants' ratings were measured on a 7-point agreement scale, with higher values indicating more favourable perceptions. Linear mixed-effects models were used to test for statistically significant differences between labels while accounting for the repeated measures for participants.

The Organic label received high ratings, excelling in Sustainability (M = 5.96; all $\beta < 0$, $p < .001$)), environmentally friendliness (M = 4.96; all $\beta < 0$, $p < .001$), attractiveness (M = 5.26; all $\beta < 0$, $p < .001$) and usefulness (M = 5.25; all $\beta < 0$, $p < .001$). The Climate label scored higher than all other labels in Sustainability (M = 5.06) and Environmental Friendliness (M = 4.53), except for the EU organic label. Likewise, its ratings in Attractiveness (M = 4.58) and Usefulness (M = 4.51) were high, but again significantly lower compared to the Organic label. Importantly, the Climate label scored second lowest on familiarity, which reflects that this label was hypothetical and therefore unknown to consumers. The Social Norm label received high scores across most attributes, particularly in Attractiveness (M = 4.78), Familiarity (M = 4.66; second highest), and Usefulness (M = 4.67). The Premium Brand label stands out for scoring highest in expensiveness (5.43; all $\beta < 0$, $p < .01$), and Quality (M = 5.46; all $\beta < 0$, $p < .001$) compared to all other labels. The Private Label Basic Brand label in turn scored lowest in Expensiveness (M = 3.15; all $\beta > 1$, $p < .001$) and lowest in familiarity (M = 3.72; all $\beta > 0$, $p < .001$), suggesting both goals were met with the label signalling low prices and no prior perceptions of brand value. The Private Label Premium Brand label scores second highest in Expensiveness (M = 5.29) and second highest in Quality (M = 5.29) yet does not match the Premium Brand in attractiveness.

Figure 11. Consumer perceptions of product labels



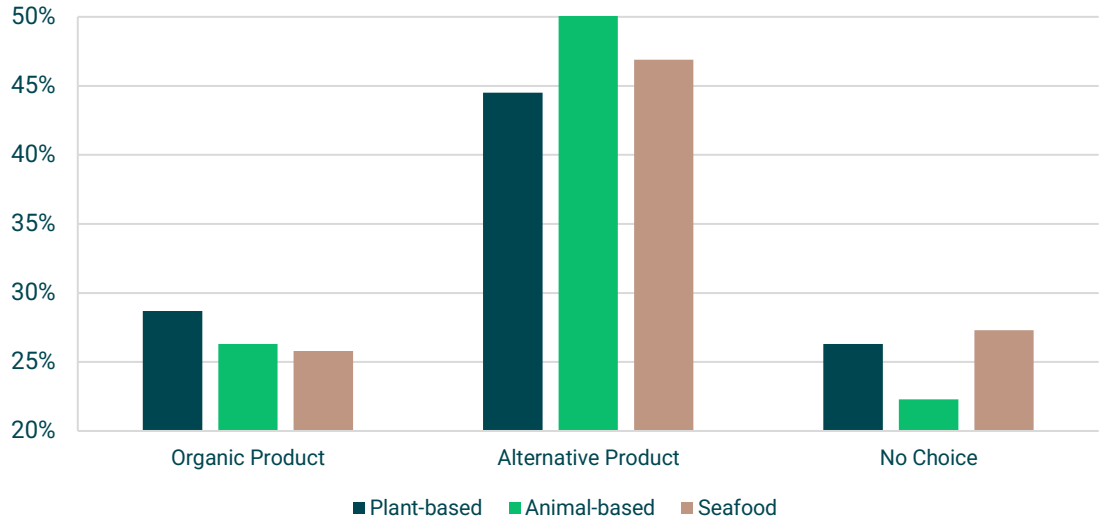
4.2.2. Marketing Strategy Effectiveness

Observations for Organic Buying Behaviour

The dataset includes a comprehensive total of 31,140 purchase decisions, recorded from 1,038 unique participants over three waves of data collection each featuring buying decisions for 10 different product categories. Of all recorded observations, 27.5% represented the purchase of an organic product, 48.0% of decisions were for conventional alternatives, and the remaining 24.6% of decisions involved participants opting not to choose any of the available options. The observed choice pattern was relatively consistent across the food categories (see Figure 12). Within the plant-based category, which included bananas, orange juice, pasta, coffee beans, and patties,

28.7% of the observed purchases were organic. In the animal-based category, encompassing chicken, yoghurt, and cheese, 26.3% of purchases were organic. Similarly, 25.8% of purchases in the seafood category, comprising of salmon fillet and canned tuna, were organic.

Figure 12. Share of purchase decision outcome by product category



The observed choices reflect a modest uptake of organic products within each category, emphasising that conventional products still dominated overall purchase decisions. The percentage of "no choices", i.e., the skipping a food category altogether, was overall modest, however, varied across product categories. The plant-based category of patties saw the highest share of no choices at 51,6 percent, followed by coffee beans and the animal-based category of salmon filet with no choice rates of over 30 percent. In contrast, pasta, cheese, and banana observed the lowest no choice rates of well below 20 percent. All other categories, including orange juice, chicken, canned tuna, and yoghurt, fell into a moderate range of around 18–23% no choices.

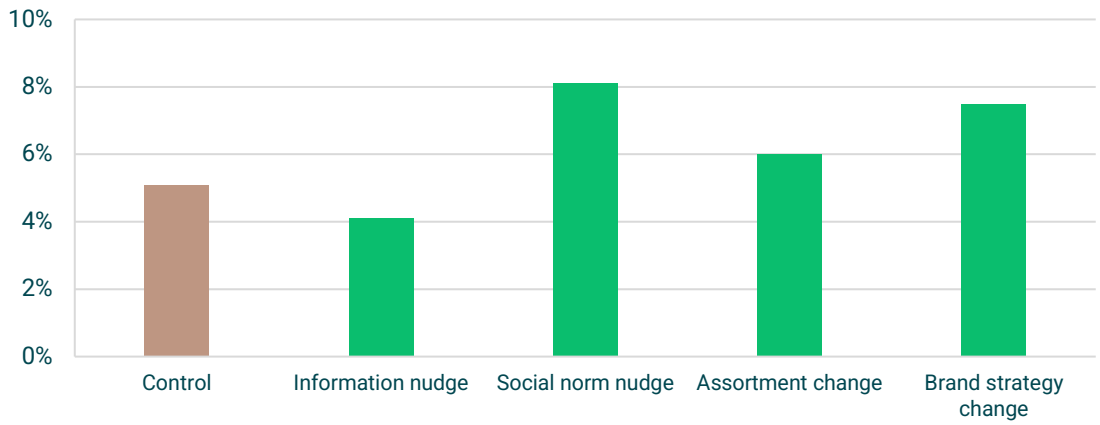
Relative Change in Organic Buying Behaviour

In the following, we present the share of organic product purchases for each of the four manipulations and the control condition. Importantly, to make differences in the observed shares of organic purchases comparable across the different manipulations, we report the relative change in the share of organic purchase decisions, calculated as the delta (i.e., difference) between the observed share of organic purchases and the expected share within each manipulation (and wave). Following the design of the choice sets, the default expected share of organic purchases is 25%, since for all these choice sets one out of four products comprising a choice set was organic. For this default scenario, if the observed share of organic purchases is 26%, the relative change would be +1%. In turn, for the choice sets in the assortment change manipulation, the number of options available in a given choice set were increased over the three waves, with the expected share for choice sets with this manipulation was 50% in wave 2 and 75% in wave 3. In the latter cases, observed shares of organic purchases are reported as deltas to these expected shares.

Figure 13 illustrates the relative change in organic purchases for each manipulation, showing that the social norm nudge manipulation yielded the highest positive deviation in organic purchases with an increase of 8.1 percent from the expected share of organic purchases (25%). This is closely followed by the brand strategy change manipulation at 7.5 percent. The assortment change manipulation resulted in a 6.0% deviation; this is the deviation from the expected share

of organic of 25% in wave 1, 50% in wave 2 and 75% in wave 3. The control and information nudge manipulations resulted in smaller deviations of 5.2% and 4.1%, respectively.

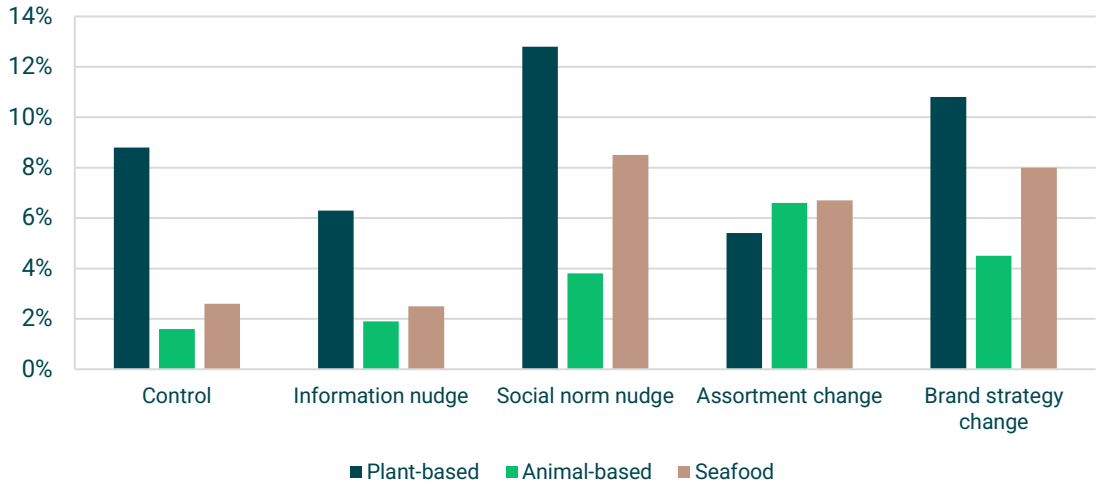
Figure 13. Relative changes in organic buying behaviour across manipulations



Relative Change in Organic Buying Behaviour Across Product Categories

The relative changes in organic purchases varied across the three primary food categories: plant-based, animal-based, and seafood. Figure 14 illustrates these differences. In the plant-based category, social norm nudges resulted in a positive delta of 12.8% relative to the expected share of organic purchases, followed by brand strategy changes at 10.8%, and assortment changes at 5.4%. For animal-based products, assortment changes showed a 6.6% delta, with brand strategy changes and social norm nudges coming in at 4.5% and 3.8%, respectively. In the seafood category, social norm nudges and brand strategy changes showed a delta in observed organic purchases of 8.5% and 8.0% over the expected share, respectively, while assortment changes showed a 6.7% positive deviation.

Figure 14. Relative changes in organic buying behaviour across food categories



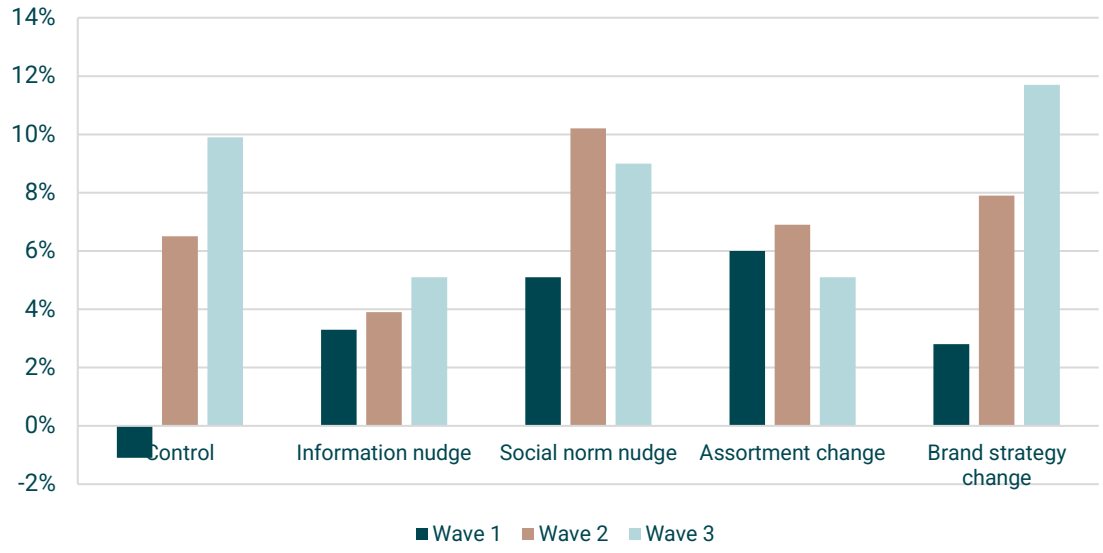
Relative Change in Organic Buying Behaviour Over Time

The temporal dynamics of the manipulations can be examining through the relative changes in organic buying behaviour over the three observational waves, as illustrated in Figure 15.

In the control condition, deltas of the overserved organic purchases compared to the expected share of organic purchases were recorded as -1.1% in Wave 1, 6.5% in Wave 2 and 9.9% in Wave 3, suggesting that in absence of manipulations, the share of organic purchases naturally increased over the course of the three waves of the online supermarket experiment.

The information nudge manipulation in turn exhibited incrementally increasing relative changes in organic buying, starting at 3.3% in Wave 1, 3.9% in Wave 2, and reaching 5.1% in Wave 3. For choices exposed to the social norm nudge manipulation relative changes in organic buying were 5.1% in Wave 1, peaking at 10.2% in Wave 2, and slightly declining to 9.0% in Wave 3. For the assortment change manipulation, relative changes were relatively stable, recorded at 6.0% in Wave 1, 6.9% in Wave 2, and 5.1% in Wave 3. Finally, the brand strategy change manipulation exhibited a consistent upward trend in the relative changes, starting at 2.8% in Wave 1, increasing to 7.9% in Wave 2, and culminating at 11.7% in Wave 3.

Figure 15. Relative changes in organic buying behaviour over time



Relative Change in Organic Buying Behaviour Across Countries

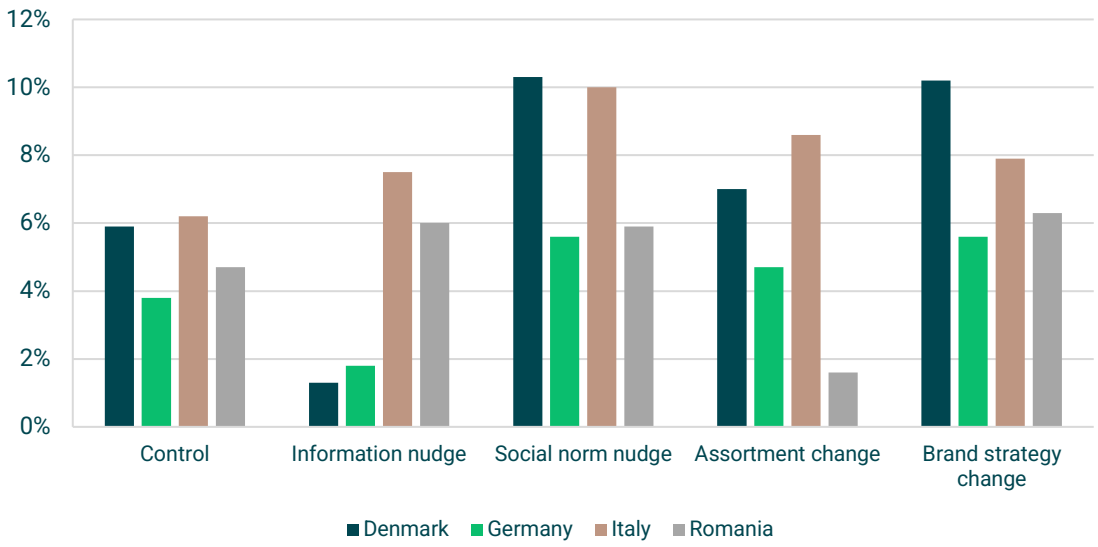
Figure 16 provides an overview of the relative changes in organic purchasing behaviour compared across the four countries: Denmark, Germany, Italy, and Romania.

In Denmark, the social norm nudge (10.3%) and brand strategy change (10.2%) resulted in the most pronounced relative increases in organic purchases, whereas the information nudge manipulation had a minimal effect, resulting in only a 1.3% increase.

Germany exhibited more modest overall changes, with both the social norm nudge and brand strategy change yielding increases of 5.6%, and the Information nudge showing the smallest impact at 1.8%. Italy demonstrated the largest relative changes overall, particularly with the social norm nudge (10.0%) and assortment change (8.6%), reflecting a heightened sensitivity to these interventions. Romania displayed the smallest overall changes in organic purchasing, with the

brand strategy change (6.3%) and social norm nudge (5.9%) generating the highest relative increases, while the assortment change had the least influence, at 1.6%.

Figure 16. Relative changes in organic buying behaviour by country



Overall effectiveness of marketing strategies

To evaluate the effectiveness of the four manipulations on promoting organic product selection among consumers (relative to the control condition), we fitted a logistic mixed model (estimated using ML and BOBYQA optimiser). Recognising that the assortment change condition involved varying the proportion of organic products available across waves (25% in Wave 1, 50% in Wave 2, and 75% in Wave 3), we incorporated an offset variable in our logistic mixed-effects model to adjust the model for the known deviations in probabilities of the response variable. The model included fixed effects for the intervention conditions, time, and their interaction, as well as random intercepts for participants to account for repeated measures. The offset is calculated as the expected log-odds of selecting an organic product based on the known organic share (e.g. 25%, 50% or 75%) for each manipulation and wave.

Results from the model, summarised in Table 8, revealed significant positive effects for the Information Nudge and Social Norm Nudge manipulations, even after adjusting for the expected probabilities related to the increased organic product assortment. Specifically, participants exposed to the Information Nudge had 1.86 times higher odds of choosing an organic product compared to the control group at baseline. Similarly, the Social Norm Nudge increased the odds of selecting an organic product by 98% over the control. The Assortment Change intervention also demonstrated a significant positive effect of 48 percent beyond the expected increase from the share of organic item availability within each assortment. Least impactful was the brand strategy change manipulation with a significant effect of 1.34.

Table 8. Logistic mixed-effects model results for organic buying behaviour

Predictors	*Odds Ratios*	*CI*	*p*
Fixed Effects			
(Intercept)	0.47	0.38 – 0.58	**<0.001**
Information nudge	1.86	1.41 – 2.45	**<0.001**
Social norm nudge	1.98	1.51 – 2.60	**<0.001**
Assortment change	1.48	1.12 – 1.96	**0.005**
Brand strategy change	1.34	1.02 – 1.77	**0.035**
Wave	1.44	1.31 – 1.57	**<0.001**
Information nudge × Wave	0.73	0.65 – 0.83	**<0.001**
Social norm nudge × Wave	0.79	0.70 – 0.89	**<0.001**
Assortment change × Wave	1.00	0.88 – 1.14	0.944
Brand strategy change × Wave	0.93	0.82 – 1.05	0.231
Random Effects			
σ^2	3.29		
$\tau_{00\ Participants}$	1.81		
ICC	0.36		
$N_{\ Participants}$	1038		
Observations	23491		
Marginal R^2 / Conditional R^2	0.014 / 0.364		

The results further show a significant general upward trend in organic product selection over time, with the odds increasing by 44% with each subsequent wave regardless of manipulation. However, the effectiveness of the information nudge and social norm nudge manipulations diminished over time, as indicated by significant interaction terms with negative coefficients. The information nudge's effectiveness decreased by 27% per wave, and the social norm nudge decreased by 21% per wave. In contrast, the assortment change and brand strategy change manipulations did not show significant changes in effectiveness over time. Further statistical models, while suggesting significant effects for gender (with males being significantly less likely to buying organic; OR = 0.70, $p < 0.001$), age (with older individuals being more likely to buy organic; ; OR = 1.01, $p = 0.038$), and country (with Germans being less likely to buy organic compared to Denmark, Italy and Romania; OR = 0.77, $p = 0.027$), show no changes for the size or effectiveness of the manipulations nor their changes in effectiveness over time.

4.2.3. Individual Label and Strategy Effects

Due to variations in the implementation of the different marketing strategies (information nudge, social norm nudge, assortment change, and brand strategy change) their effectiveness is evaluated separately to provide a more nuanced understanding of their impact on participants' organic buying behaviour. The following sections present the results of separate generalised linear mixed-effects model with binomial link functions, examining the likelihood of participants' decision of purchasing organic versus conventional products for the respective manipulations. The analyses are constrained to those data which represent choice sets in which the respective manipulation was present. Random intercepts for participant ID are incorporated in all models to account for individual-level variability due to repeated measures (across products and waves).

Effect of Climate label in Information strategy

Table 9 summarises the results of the first mixed-effect model which was fitted with fixed effects for the hypothetical "EU Climate" label (present vs. not present on the organic product), wave,

time until the product was added to the cart, price of the selected product, and product type, along with an interaction term to assess whether the label's effect varied across time.

The results of this analysis indicate a significant positive effect of the "EU Climate" label on the likelihood of selecting organic products, with this effect remaining consistent across waves. This finding suggests the potential of a climate information label to encourage consumers to choose organic products rather than discourage them.

Table 9. Results of generalised linear mixed-effects model for climate information label

Predictors	*Odds Ratios*	*CI*	*p*
Fixed Effects			
(Intercept)	0.16	0.12 – 0.22	**<0.001**
Climate Information label (vs. no label)	1.73	1.05 – 2.84	**0.032**
Wave	1.04	0.94 – 1.16	0.426
Time until product added to cart	1.00	1.00 – 1.00	0.396
Price of selected product	1.06	1.05 – 1.08	**<0.001**
Product category [Animal-based vs. Plant-based]	0.70	0.59 – 0.84	**<0.001**
Climate Information label × Wave	0.96	0.77 – 1.20	0.736
Random Effects			
σ^2	3.29		
$\tau_{00\ PPID}$	1.67		
ICC	0.34		
N_{PPID}	1015		
Observations	4624		
Marginal R^2 / Conditional R^2	0.042 / 0.365		

Effect of Social Norm label in Social Norm Nudging Strategy

Table 10 presents the results of the model fitted to explain the effects of social norm strategy. Fixed effects in the model include the presence of the social norm nudge label (on the organic product), wave, time until a product was added to the cart, product price, product category (animal-based vs. plant-based), and an interaction term (social norm nudge label × wave) to assess changes in the label's effect over the three waves.

The results suggests that the presence of the social norm nudge label on the organic product did not significantly influence participants' likelihood of purchasing it (OR = 1.46, p = 0.143). This suggests that the significant effect of the social norm nudge manipulation relative to the control condition (as shown in Table 10) is not linked to the organic product carrying the label, but rather the mere presence of the label within a given choice set activating normative behaviours which in turn lead to the organic product more likely being chosen. The non-significant interaction between the nudge label and wave (OR = 0.99, p = 0.930) further suggests that the absence of the social norm nudge label's effect remained consistent across waves.

Table 10. Results of generalised linear mixed-effects model for social norms nudging label

Predictors	*Odds Ratios*	*CI*	*p*
Fixed Effects			
(Intercept)	0.16	0.12 – 0.23	**<0.001**
Social Norm Nudge label (vs. No label)	1.46	0.88 – 2.41	0.143
Wave	1.14	1.03 – 1.26	**0.015**
Time until product added to cart	1.00	0.99 – 1.00	0.179
Price of selected product	1.09	1.07 – 1.10	**<0.001**
Product category [Animal-based vs. Plant-based]	0.50	0.42 – 0.61	**<0.001**
Social Norm Nudge label × Wave	0.99	0.79 – 1.24	0.930
Random Effects			
σ^2	3.29		
$\tau_{00\ PPID}$	2.43		
ICC	0.42		
$N_{\ PPID}$	1015		
Observations	4762		
Marginal R^2 / Conditional R^2	0.066 / 0.463		

Effect of Brand labels in Brand Strategy Change Strategy

Table 11 summarises the results of the model fitted as a function of branding strategies, that is the presence of Premium Brand, Private-Label Basic Brand, and Private-Label Premium Brand labels on the organic product compared to the product being not branded. The model included time until a product was added to the cart, product price, and product category (animal-based vs. plant-based). Because the brand labels were introduced over time (Privat Label Basic Brand label in wave 2 and Private Label Premium Brand label in wave 3), the model did not include Wave as an independent predictor.

The results reveal significant differences in consumer responses to brand labels. While the Premium Brand label (OR = 0.44, $p < 0.001$) and Private Label Basic Brand label (OR = 0.19, $p < 0.001$) significantly reduced the odds of the organic product being select, the Private Label Premium Brand label greatly increased the odds of selecting organic products (OR = 6.13, $p < 0.001$). These results suggest that consumer preferences are highly sensitive to branding cues, with Private Label Premium Brands exerting a particularly strong positive influence in supporting organic buying behaviour relative to the alternative branding cues.

Table 11. Results of generalised linear mixed-effects model for brand strategy labels

Predictors	*Odds Ratios*	*CI*	*p*
Fixed Effects			
(Intercept)	0.17	0.13 – 0.21	**<0.001**
Premium Brand label (vs. No label)	0.44	0.34 – 0.56	**<0.001**
Private Label Basic Brand label (vs. No label)	0.19	0.14 – 0.27	**<0.001**
Private Label Premium Brand label (vs. No label)	6.13	4.84 – 7.77	**<0.001**
Time until product added to cart	0.99	0.99 – 1.00	**0.018**
Price of selected product	1.12	1.11 – 1.14	**<0.001**
Product category [Animal-based vs. Plant-based]	0.64	0.53 – 0.77	**<0.001**
Random Effects			
σ^2	3.29		
$\tau_{00\ PPID}$	1.69		
ICC	0.34		
N_{PPID}	1020		
Observations	4673		
Marginal R^2 / Conditional R^2	0.239 / 0.497		

Effect of Assortment Change in Assortment Change Strategy

The final analysis, presented in Table 12, examines the impact of changes in assortment strategy on the likelihood of selecting organic versus conventional products. The manipulation was conducted over three waves, with a systematic adjustment in the proportion and range of organic-labelled products available. In Wave 1, 25% of products were organic labelled. In Wave 2, this proportion increased to 50%, with both organic and conventional products offering a full range of options. In Wave 3, 75% of products were organic labelled, offering full coverage, while the conventional assortment was reduced to 25% with limited range. The generalised linear mixed-effects model includes predictors such as wave, time until product selection, product price, and product category (animal-based vs. plant-based).

Table 12. Results of generalised linear mixed-effects model for assortment change strategy

Predictors	*Odds Ratios*	*CI*	*p*
Fixed Effects			
(Intercept)	0.55	0.44 – 0.69	**<0.001**
Wave 2 (vs. Wave 1)	1.45	1.21 – 1.75	**<0.001**
Wave 3 (vs. Wave 1)	2.14	1.71 – 2.68	**<0.001**
Time until product added to cart	1.00	1.00 – 1.00	0.985
Price of selected product	1.07	1.05 – 1.08	**<0.001**
Product category [Animal-based vs. Plant-based]	0.93	0.78 – 1.11	0.426
Random Effects			
σ^2	3.29		
$\tau_{00\ PPID}$	1.78		
ICC	0.35		
N_{PPID}	1015		
Observations	4755		
Marginal R^2 / Conditional R^2	0.058 / 0.388		

The results of the analysis show a significant effect of the assortment strategy on the likelihood of selecting organic products over time. In Wave 2, participants were 45% more likely to choose organic products compared to Wave 1 (OR = 1.45, $p < 0.001$). This likelihood increased in Wave

3, with participants more than twice as likely to select organic products compared to Wave 1 (OR = 2.14, $p < 0.001$). The increases in organic-labelled product assortment, culminating in Wave 3's dominant organic assortment, strongly influenced consumer preferences for organic products. These results highlight the influence of increased assortment of organic-labelled products in driving consumer behaviour toward more sustainable choices.

5. Conclusions

This research, conducted within the framework of the EU's Farm to Fork Strategy, offers a comprehensive investigation into different marketing strategies for stimulating consumer demand for organic products, a potentially pivotal element in realising the EU's ambitious objective of transitioning 25% of agricultural land to organic production by 2030. Achieving this target requires a dual approach that not only expands organic farming but also addresses the complexities of consumer behaviour. Factors such as competing environmental claims, social norms, product assortment, and brand perception were examined as critical determinants of organic purchasing decisions. By employing a realistic online supermarket experiment that imitates shopping behaviour under close to real-world conditions, this research provides nuanced and actionable insights into how a set of different marketing strategies can help effectively shape consumer preferences and advance the EU's sustainability agenda.

The findings underscore the indispensable role of marketing strategies that integrate environmental messaging, leverage social influences, optimise product assortment, and establish robust brand identities. The four tested approaches (information labels, social norm nudges, assortment changes, and brand strategy adjustments) offer distinct yet complementary pathways for fostering sustainable consumer behaviour across Europe. These results highlight the importance of coordinated efforts among policymakers, retailers, and stakeholders to design interventions that not only enhance organic consumption but also align with broader environmental goals set by the European Union. This report serves as a guide for creating impactful marketing frameworks that can be adapted to diverse consumer contexts and market conditions.

5.1. Information Labels

The prospect of a future release of an EU Climate label was investigated for potential adverse effects on the goal of promoting the share of organic products purchased in supermarkets. This research indicates a neutral to positive influence of a "EU climate label" on consumers' organic purchasing behaviour. This suggests that enhancing the visibility of sustainability attributes through such a label may guide consumer choices toward, rather than away from, organic alternatives. This finding advocates a careful implementation of sustainability claims to boost or maintain the attractiveness of organic products compared to its alternatives. However, the potential for information labels to compete with or distract from existing organic certifications underscores the need for cohesive messaging. Policymakers and marketers must ensure that these labels work synergistically to reinforce the value proposition of organic products without diluting their market appeal. Such strategic alignment is essential to foster trust and clarity in sustainability communication. In conclusion, while this study found a neutral to positive influence of a potential EU climate label on consumers' organic purchasing behaviour under the tested conditions, further research is needed to examine interactions of such an information labels with the organic label more thoroughly, to understand the mechanisms behind these choice patterns, and to confirm the absence of competitive effects.

5.2. Social Norm Nudging

Social norm nudges, designed to leverage societal behaviours and expectations, demonstrated incremental increases in organic purchasing. While the social norm nudge label alone did not produce immediate significant effects, the findings of this research suggest that mere exposure to social norm cues and contextual reinforcement do gradually amplify its impact on organic purchases. However, its incremental effect on organic buying behaviour decreases over time. This finding suggests a potential for social norms cues to act as an intermediate driver of behaviour change, perhaps especially when integrated into broader marketing frameworks.

By emphasising descriptive norms (what others are doing) and thereby also pointing at injunctive norms (what others approve of), this strategy aligns with the EU's broader goals of fostering community-driven sustainable consumption. The experiment illustrates the importance of integrating social validation mechanisms to encourage organic product choices. However, it shows less effectiveness than other strategies which may prove more sustainable in the long run.

Retailers and policymakers might be able to amplify the effectiveness of social nudges by embedding them within a cohesive narrative that resonates with societal values and cultural contexts. In all cases, the gradual but measurable impact of social norms indicates their short-term potential in promoting sustainable consumption patterns.

5.3. Assortment Changes

Assortment adjustments, specifically increasing the variety of organic-labelled product options, emerged as one of the most effective strategies for influencing consumer organic buying behaviour. The findings of this research demonstrated that greater availability of organic product options significantly enhances their selection by consumers.

By expansion of organic assortments, retailers can nudge consumers toward organic product choices, creating an environment where organic products are not only more accessible but even emerging as the preferred choice. Particularly interesting is that in the condition where the organic assortment matched the assortment of the conventional products, consumers were 45% more likely to choose the organic option compared to when the organic assortment availability was that of 25%. These findings underscore the critical role of assortment in shaping purchasing decisions. In essence, when consumers are presented with a wider range of organic products, they are more likely to find options that are appealing and are willing to buy those options.

By ensuring a variety organic options are prominently featured and accessible to diverse market segments, this strategy has the potential to boost the visibility and appeal of organic farming. While its successful implementation requires careful coordination and long-term planning by retailers, it presents a transformative opportunity to embed sustainability deeper into consumer habits and retail practices, aligning with the EU's organic farming objectives.

5.4. Brand Strategy Changes

Finally, the evaluation of brand strategies revealed pronounced variations in consumer responses towards branding cues. This research tested the potential of private label brands to stimulate organic buying behaviour and provide a viable alternative to premium brands in the organic sector. Promisingly, the findings show that private-label premium brands can be effective in driving organic product purchases, probably reflecting their ability to convey trust, quality, and value. This highlights the strategic importance of branding in shaping consumer preferences for organic products, as branding serves as a key mechanism for reinforcing consumer confidence

in organic offerings, particularly in markets where price premiums may otherwise deter purchases. Importantly, this shows that by aligning private label brand strategies, retailers have the power to enhance the perceived value of organic products and differentiate them from conventional alternatives. This research emphasises the potential for premium branding to act as a catalyst for organic adoption, creating a strong association between quality and sustainability. Policymakers and marketers are encouraged to collaborate on initiatives that elevate the visibility and reputation of organic brands, leveraging their influence to support the EU's environmental objectives.

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Project Coordinator: IFOAM Organics Europe
R&I Associate Manager Ambra De Simone
ambra.desimone@organicseurope.bio

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