Are consumers' attitudes regarding sustainability reflected on food choices? Evidence from a Discrete Choice Experiment in 10 European countries

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ABSTRACT: We assess whether consumers' attitudes towards sustainability are reflected in their food choices. Using an online survey, we elicit from 20,000 consumers in ten European countries the main motives when purchasing food, front-of-pack elements that signal differences in sustainability and purchase decisions. At the aggregated level, our results show that self-declared purchase motives translate into consumer choices, albeit in a divergent manner for the health and environmental components of sustainability. The findings can help policymakers and businesses to learn about the gap between attitudes and purchase behaviour and help them develop appropriate policies and strategies to promote sustainable food purchases.

¿Reflejan los consumidores sus actitudes respecto a la sostenibilidad en sus decisiones de compra? Resultados de un experimento de elección en 10 países europeos

RESUMEN: Evaluamos si los consumidores reflejan sus actitudes hacia la sostenibilidad en sus decisiones de compra. Para ello realizamos una encuesta en línea a 20.000 consumidores en 10 países europeos sobre motivos de compra, elementos del envase que comunican diferencias en sostenibilidad y decisiones de compra. Demostramos que los motivos de compra se trasladan a las decisiones de compra, aunque de manera divergente para los componentes de salud y medio ambiente de la sostenibilidad. Los resultados pueden ser utilizados para entender la divergencia entre actitudes y decisiones de compra y desarrollar estrategias y políticas para promover un consumo más sostenible.

KEYWORDS / PALABRAS CLAVE: Attitude-behaviour gap, consumer behaviour, environmental sustainability, food products, healthiness / Discrepancia entre actitudes y comportamiento, comportamiento del consumidor, sostenibilidad ambiental, productos alimentarios, salud.

JEL Classification / Clasificación JEL: C35, D12, I12, M3.

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1. Introduction

Integrating sustainability into product and process innovation has become a significant concern for agri-food companies. However, their success depends on consumers' willingness to pay (WTP) for and purchase more sustainable food products (White *et al*., 2019). Public policies and companies' marketing and pricing strategies can be crucial in encouraging shoppers' sustainable food choices, so a better understanding of the factors driving them is needed (Boon & Edler, 2018; Vermeulen *et al.*, 2020).

With the growing global commitment to sustainability (UN, 2015), governments, companies and individuals increasingly know the need to shift to more sustainable consumption patterns (Vergura *et al.*, 2023). In response, many companies have placed sustainable value creation at the heart of their business strategies, aiming to achieve business performance targets while respecting people and the environment. However, for this reaction to affect overall consumption patterns individuals need to translate their awareness and attitudes into actual purchasing behaviour. Sustainable food is food produced, marketed and consumed in a way that has a positive or neutral impact on the natural environment (environmental sustainability), has broad-based benefits for society, including health (social sustainability) and is profitable (economic sustainability) (Nguyen, 2018). Therefore, sustainability-related attributes of food products can be linked with different dimensions of product sustainability (e.g., ingredients, formulations, origin, packaging materials, and recycling information). Consumers can use information about these attributes as cues when making purchasing decisions (Bangsa & Schlegelmilch, 2020). Abundant literature suggests that, when purchasing food products, consumers reflect their values by paying significant attention to sustainability-related attributes and purchasing products that carry them even if they are marketed at higher prices (Piracci *et al*. 2024). However, paying attention or declaring WTP does not mean that these aspects are the main drivers of consumption decisions (Vermeir *et al.*, 2020). A recent study reflects this, noting that 65 % of respondents want to buy more sustainable products, but only 26 % report doing so (White *et al*., 2019). This mismatch is referred to as the value-action gap or attitude-behaviour gap, defined as the disparity between individuals' environmental, social, economic or ethical concerns and their lifestyle or actual purchasing decisions (Vermeir & Verbeke, 2006; Vermeir *et al.*, 2020). This gap is problematic because agri-food companies depend on consumers buying sustainable products to achieve sustainability goals while sustaining profits and economic viability and ultimately gaining a competitive advantage from innovating in more sustainable products. For instance, according to White *et al*. (2019), Unilever estimates that 70 % of its carbon footprint reduction depends on which products consumers buy.

The value-action gap may be partly due to information asymmetry, as consumers cannot directly and accurately judge food products' sustainability but infer it through product cues given by producers and marketers in food packages (Olson,

1972; Grunert, 2002). Therefore, food companies design the packaging of their food products using explicit (branding, labels, claims or any printed information) and implicit (colour, images, shapes and materials) attributes assumed to convey sustainability in its various facets (e.g. environmental, social and health). In the European Union, the average share of newly introduced products with a sustainable claim or label stands at 25.7 % during the period 2005-2021, with an average annual growth rate close to 3 % (Nes *et al*., 2024). Yet, it is crucial to understand the 'meaning' consumers attach to the various packaging elements to explain consumer perceptions and choices (Ng *et al*., 2013).

Values might not translate into actions also due to the existence of more important motives driving consumer purchases (Vermeir & Verbeke, 2006) or the interaction of multiple packaging cues with consumer attitudes (Vakratsas & Ambler, 1999; Wang *et al.*, 2022). In this line, evidence from comprehensive surveys such as the Eurobarometer (European Commission, 2020) point to taste, safety and price, and not sustainability, as the most important factors declared by consumers as driving their food products' purchases. Other studies also signal quality, convenience and brand familiarity as more important motives than sustainability (Vermeir & Verbeke, 2006).

However, as these sources do not include data on purchase behaviour we cannot fully understand how the purchase motives and decisions diverge (Bangsa & Schlegelmilch, 2020). Previous studies show that multiple factors influence consumer decisions, and choices usually involve trading off several product attributes. In addition, given the expected interplay of these product attributes with purchase motivations, we hypothesise that when purchasing, consumers attach a higher value to attributes signalling sustainability when sustainability is a key purchase motivation. To overcome this limitation, we implement an experiment where both attitudes and (stated) behaviour are elicited from the same sample, which allows us to test this hypothesis. In our experimental design, the absence of a value action gap would translate into consumers valuing more front-of-pack (FOP) attributes signalling differences in sustainability if their main purchase motive is sustainability. To measure (stated) action, we use a discrete choice experiment (DCE) approach. In the last two decades, there has been a growing interest in applying DCE to inform decision-making processes related to environmental policies. DCE is based on the idea that a good or service can be described as a combination of several attributes with varying levels. Respondents choose among different alternatives of attributes and levels, so that they implicitly value each attribute. This allows the estimation of welfare measures by statistical inference. This approach is implemented via an online survey responded by more than 20,000 individuals in 10 European countries.

This study contributes to the existing evidence on the value-action gap by examining the key factors influencing consumer sustainable food choices with a comprehensive, unique, multi-product, multi-national and representative dataset. The geographical diversity of our dataset is important because of possible differences in culture, values and beliefs and their effect on consumer perceptions and choices (Van Trijp

& Van der Lans, 2007). Another unique feature of this study relates to introducing purchase motivations and perceptions about sustainability from product attributes into (hypothetical) food choices. DCEs have become a method increasingly used in food research to uncover trade-offs when choosing alternatives, particularly when exploring credence attributes related to sustainability (Lizin *et al.*, 2022). However, behaviours elicited using DCE are still not a perfect predictor of actions due to the hypothetical nature of the choices consumers make.

The findings can help policymakers and businesses learn about consumers' sustainable food purchasing behaviour and perceptions and help develop appropriate policies and strategies to promote sustainable food purchases.

The rest of the paper is organised as follows. Section 2 presents the methods, including sample, data collection, questionnaire and experiment development, and data analysis methods. Then, in Section 3, the analysis and results are presented. Finally, section 4 discusses the results and implications and concludes.

2. Material and methods

2.1. Sample and data collection

This study data was collected online from a sample of 20,133 consumers in ten European countries (Czech Republic, Germany, Spain, France, Italy, Lithuania, Netherlands, Austria, Poland and Romania) with an even distribution across countries. These countries were selected with the objective to cover diversity of EU countries in terms of: geographical distribution, size, income, expenditure on food, weight of intra-EU trade in total food availability, main priorities when purchasing food and awareness of food FOP elements. Participants had to be over 18 and make regular food purchases (at least once a month) for their households. For each of these countries a market research company recruited participants from the proprietary on-line panels. Recruitment from the panels was launched to obtain a representative sample for each country based on gender, age, income group, and geographical region and was implemented through a quota selection system, defined for each country following official statistics sourced from Eurostat. The quotas were successfully achieved except for regions and people aged above 65 years, mainly due to the lower internet access of this age group. Fieldwork took place from October 22nd to November 9th 2021. The most frequent household in our sample has a 35–54-year-old woman in charge of food purchases, with very high income[1] and is composed of two adults with no children. Details on the sample composition, which meet the representativeness criteria mentioned above, are provided in Annex A.

[1] Income was measured in 10 steps. The upper and lower limits for each step was tailored to each country's GDP per capita. Very high income reflects the highest two steps which, for example correspond to net monthly incomes above 2,000 euros in Spain and above 2,950 euros in the Netherlands.

2.2. Questionnaire

The questionnaire was designed by the authors and tested for clarity in person and online in all participating countries. The final questionnaire after a series of screening questions to check for quotas consisted of three main sections: i) an experiment to identify food packaging elements that made aware that products are different, ii) a DCE where consumers choose between different products based on packages, and iii) a set of follow-up questions including main motives driving food purchases. The company implementing the fieldwork scripted the survey and the experiment in its proprietary survey platform in the different local languages. The following sections describe each of the three sections of the questionnaire in more detail.

2.3. Product and front-of-pack element selection

The selection of products and FOP elements used in the questionnaire was informed by discussions held in focus groups in the 10 countries, which allowed to identify the most relevant FOP elements and products to be included in the online experiment. A professional designer developed 30 hypothetical product visualisations covering 15 products, covering multiple product categories, and 18 FOP elements to facilitate the focus groups. From this initial list of products and FOP elements, a selection of six products and eight FOP elements was used in the online experiment.

For the choice of products, the focus groups discussed the frequency with which a specific product was purchased and consumers' importance or attention to the product package in their purchasing decisions. The choice of FOP attributes relied on the importance of the attributes for consumers' perceptions of differences between product versions, the importance for consumers' expectations of differences in food product characteristics (e.g. ingredients, quality, origin and sustainability-related characteristics such as product healthiness and environmental sustainability) and the importance for consumers' purchase decisions. FOP elements were classified into two groups: claims or logos and tweaks. The formers were either present or not in a specific product version. For the latter, one of two options was present in a specific product version (e.g. one or another background colour). Due to the limited number of package designs that could be developed, four products were tested in ten countries, while chocolate and yoghurt were tested only in five countries each. All the FOP attributes used in the experiment are allowed under current legislation on food labelling. The products and FOP attributes analysed are summarised in Table 1**,** while the implementation of the different FOP elements for one of the products studied is depicted in Figure 1.

TABLE 1

Products and front-of-pack elements used

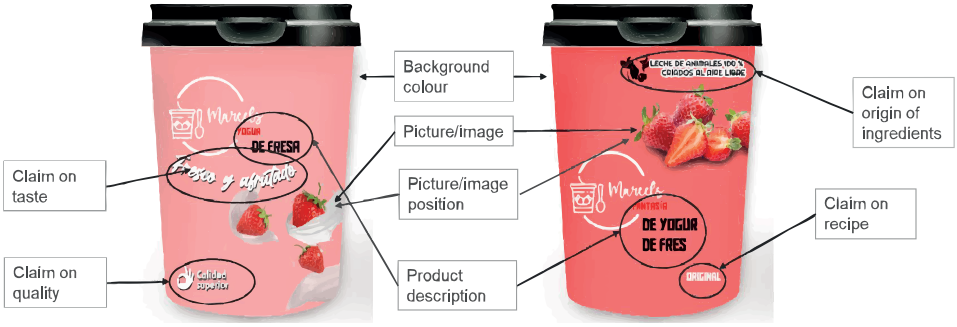
Products	FOP elements
Instant coffee[a]	Background colour
Crisps[a]	Picture/image
Baby food[a]	Positioning of the picture/image
Fish fingers[a]	Product description
Chocolate[b]	Claim on the origin of ingredients
Yoghurt[c]	Claim on taste
	Claim on recipe
	Quality logo

Notes: [a] products implemented in all countries, [b] products implemented in Czechia, France, Italy, Austria, and Romania, [c] products implemented in Germany, Spain, Lithuania, the Netherlands and Poland. All FOP elements were applied to all products.

Source: own elaboration.

FIGURE 1

Example identifying the differences in the front-of-pack elements of a pair of product versions A and B (yoghurt used in Spain)



Source: own elaboration.

2.4. Identifying elements that make consumers aware that products are different

The first task consumers faced involved presenting consumers with two packages side-by-side that differed in two or more FOP elements. They were then asked three successive questions eliciting i) whether they considered the packages to be different, ii) whether the product inside the packages differed and if so, iii) in what product characteristic(s) they differed. Products could be declared to differ with regard to eight characteristics, including two that are relevant for this study: healthiness and environmental sustainability[2]. Participants had to respond to these three questions ten times, two times for each of the five products evaluated. The order in which they saw the products as well as the positioning of the different versions on the screen were randomized.

2.5. Discrete choice experiment

To capture the action dimension of the value-action gap try to mimic food purchase behaviour using a DCE. The main advantage of DCE is its capacity to deal with multi-attribute questions and to allow for trade-off analysis (Hoyos, 2010). On the other hand, the hypothetical nature of the choices we ask consumers to perform raises hypothetical bias concerns (Penn & Hu, 2018). Most of the hypothetical bias critique relates to the fact that the estimated willingness to pay values do not replicate in real markets as these are inflated due to lack of budget constraint or salience from the experimental design (Menapace & Rafarelli, 2020). However, our approach does not focus on specific WTP values, rather on the impact of attitudes on those values and using variables that come from independent parts of the survey. Thus, while not being fully able to discard that our measurement of "action" is contaminated by hypothetical bias, we consider that the risk is lower than when deriving pure WTP estimates.

The implementation of the DCE used nine attributes. First, it took into account the eight FOP elements and the fact that each of them could take one of two versions (presence or not for claims and logos, one or another version for tweaks). In addition, a price vector varying across countries was included for each product. The prices were selected following a three-step process. In the first step, data was collected from Statista on the value in million euro and volume in million kg of sales in 2020 of product groups relevant to each of the six products in the experiment. By assuming a standard weight for each product based on the typical weight of products reported in JRC (2019), volume was converted into units sold. An implicit unit price for each product was then calculated by dividing the total value by the total units sold. This was done separately for each country. Table 2 provides the Statista product categories and the assumed standard unit weight for each experiment product.

[2] The other six characteristics that could be chosen to differ between products included ingredients, nutritional composition, taste, origin of ingredients, place of production and quality.

TABLE 2

Product category and assumed unit weight for each experiment product

Experiment product	Statista product category	Assumed unit weight (g)
Instant coffee	Instant coffee	200
Crisps	Snack food	175
Baby food	Baby food	160
Fish fingers	Fresh fish	300
Chocolate	Confectionary	100
Yoghurt	Yoghurt	450

Source: Authors' own elaboration based on Statista.com and JRC (2019).

Since Statista records value in euro, the implicit unit prices were converted to local currencies for countries outside the euro area using the average exchange rate in 2020 as published by Eurostat. In the second step, prices were collected for each experimental product in each country where the experiment was implemented. Prices were collected by visiting the websites of the larger online supermarkets (in terms of sales) in each country. The prices of the comparison products were used to evaluate whether the implicit unit prices calculated in the first step where reasonable, and if not, adjustments were made. The product price obtained following adjustments in the second step formed a baseline price for the DCE prices. In the third step, the baseline price obtained in the second step was converted into four price levels as defined by the choice set for DCE covering the 85, 95, 105 and 115 percent of the baseline prices. This approach ensured that the relative variation in price was the same across products and countries irrespective of the underlying prices or currencies.

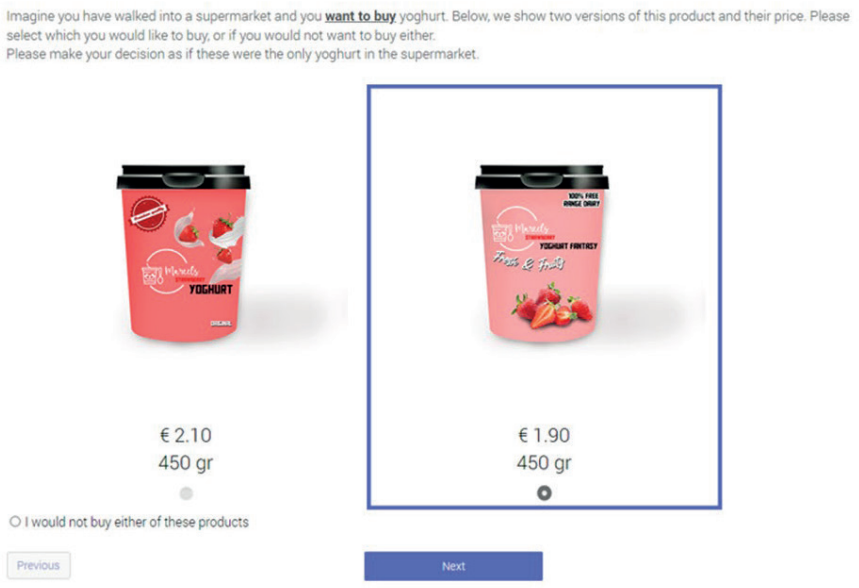
The choice set for the DCE was based on the principles of efficient design. We conducted a D-efficient design, unlike orthogonal designs, efficient designs aim to improve the precision of parameter estimates (minimizing standard errors) by allowing limited correlations between attributes (de Bekker-Grob *et al*., 2012). These experimental designs, known as D-efficient designs, maximize statistical efficiency and minimize variability in parameter estimates. For studies involving five or more attributes as in our study, with two or more levels, an orthogonal design may not always be practical (Szinay *et al*., 2021). To ensure an efficient design when using attributes with two values, for any given choice situation the two options presented to respondents should differ in most –if not all– elements. For example, if in option A, a claim on taste was included, it was most likely not included in option B. The efficient design was manually adjusted to ensure that for two choice situations, the number of attributes that differed between the two options was low (only three attributes were

different for these situations). For the other choice situations, all eight attributes differed between the options presented. In total, the efficient design results in 12 choice situations. In terms of efficiency, this tweaked design comes very close to the efficient design (approximately 93 % in relative terms). The choice set was designed unlabelled at first. The package attributes were assigned to the attribute numbers after the design, and completely at random. As such, we could not have favoured any particular package attribute (or combination thereof) during the design.

Choice sets presented to consumers included two unlabelled alternatives consisting of the different packages of the respective product as a combination of the different levels of the attributes (alternatives A and B) and the no-buy option (alternative C). An example of a choice set as presented to consumers on the online platform is presented in Figure 2. As consumers faced choices for five products, to avoid survey fatigue, the 12 choice cards where blocked into six sub-groups of two cards each, and the order in which the different products were presented to consumers was randomized.

FIGURE 2

Visualisation of the choice card on the online platform (yoghurt with price levels used for Spain)



Source: NV Ipsos platform.

2.6. Main motives driving food purchases

To close the survey, after the previous two tasks, participants answered a series of sociodemographic questions including one on what were the main motives that drove their food purchases. Consumers were shown (in random order) ten factors and asked to select the three most important they took into consideration when buying food[3]. For the purpose of this paper, we focus on three key factors price, healthiness and environmental sustainability.

2.7. Data analysis

Combining the responses to these three tasks, we can test whether consumers declaring sustainability as one of the most important factors when buying food attach higher utility to FOP elements that they declare that signal significant differences in sustainability between products. In addition, the diversity of products and countries evaluated allows us to identify country or product-specific patterns. We use logit models to identify the FOP elements that signalled differences in sustainability characteristics and conditional logit models for the DCE data[4].

First, using the consumers' responses to the differences' elicitation tasks, we run logistic regressions, taking as the dependent variable Y_i, capturing whether the consumers declare that they believe the products inside the two packages presented differ in healthiness or environmental sustainability and, as independent variables, the different FOP attributes that change between versions. Moreover, we included a set (X_k) of continuous and categorical control variables, including dummy country, respondents' socio-demographic and lifestyle characteristics, and main purchase motives. With this, we identified whether a particular FOP element signalled differences in the product sustainability-related characteristics.

Second, we used a conditional logit model for the DCE data. This model builds on the Lancastrian theory of utility maximization (Lancaster, 1966) and McFadden's random utility framework (McFadden, 1973). The model relates the probability of choice among two or more alternatives to the characteristics of the attribute levels defining those alternatives. In a DCE, the elements describing the alternatives are the attribute levels used to define each alternative in the choice task. Using random utility theory, the utility associated with an alternative is assumed to be a function of the alternative's observed (attribute levels) and unobserved characteristics. This theoretic framework also assumes that when faced with a choice between two or more alternatives, individuals will choose the alternative that maximizes their utility. While there are other alternatives to model DCE data that can take into account preference heterogeneity across individuals such as the random parameter logit or

[3] The other seven motives presented were price, ingredients, taste, brand, nutritional content, fair trade, origin of ingredients and place of production.

[4] Models were fitted using Stata 17.0's commands logit and clogit.

the latent class model, using the Hausman-McFadden test (Hausman & McFadden, 1984) we fail to reject the null hypothesis that the simpler conditional logit model is consistent and efficient for the 55 models we fit[5].

In addition to the presence or absence of the different FOP elements, we include in the utility function a three-way interaction. This interaction considers whether the different FOP elements signal sustainability (as per results of the previous analysis) and whether consumers declare that environmental sustainability or product healthiness are among their top three priorities when purchasing food. In addition, we also interact purchase priorities with the price attribute. These two groups of interaction terms are our variables of interest. If the interaction is significant and positive, this implies that consumers attach a higher value to attributes that signals sustainability if they prioritise sustainability when buying food, thus at least partially rejecting the presence of the value action gap. Last, using the estimated coefficients, we can derive the average willingness-to-pay (WTP) for each attribute by the ratio of the attribute coefficient and the price coefficient.

3. Results

3.1. Main motives when buying food

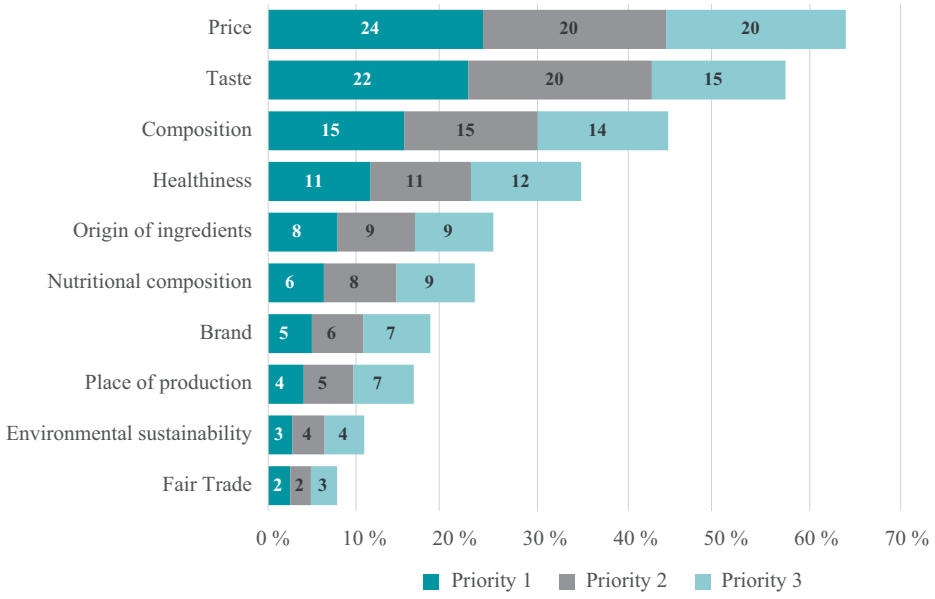
Regarding consumers' main priorities when purchasing food, we observe that price and taste are the most important motives (Figure 3). This finding is consistent with available results from Eurobarometers (European Commission, 2020). Concerning the motives of interest for our research, environmental sustainability and product healthiness are not among the top three priorities. Only 34 % of respondents consider healthiness as one of the three main motives when purchasing food, which ranks fourth among the 10 motives evaluated. When focusing on environmental sustainability, this figure falls to 11 % and ranks this motive as second to last, only ahead of fair trade.

Regarding the geographical distribution of the main purchase motivations (price and taste) and sustainability-related purchase motivations, there are differences between countries that may be reflected in the choices. Cross-country differences in purchase motives, perceptions and food choices can be expected to occur because of cultural differences (Van Trijp & Van der Lans, 2007). For example, the Czech Republic, the Netherlands and Lithuania stand out in terms of price. On the other hand, product taste is more important in the Netherlands and Germany than in other countries. Furthermore, in Germany and Austria, consumers value products' environmental sustainability more than elsewhere. Finally, in Spain and Romania, product healthiness is comparatively more valued than in other countries.

[5] This decision is further supported by two additional analyses. First, the increase of model fit moving form conditional logit models to random parameters one was marginal (an average of 2 % increase in McFadden's R^2 and under 1 % in the Akaike Information coefficient). Second, less than 5 % of the estimated standard deviation of the coefficients are significant at the 10 % level.

FIGURE 3

Percentage of respondents mentioning different priorities as the three most important when purchasing food



Source: Own elaboration based on survey responses.

3.2. Front-of-pack elements signalling sustainability

Overall, consumers declared that the two packages presented to them were different in 67 % of product pairs assessed[6]. However, only in 45 % of the cases did they consider (inferred) that the products inside the packages were different. In 38 % of the cases where consumers perceived differences in packages, these were not strong enough to make them believe the products inside the packages were different. Out of the 45 % of the cases where consumers considered the products were different, in 18 % of the cases, they believe they differed in terms of healthiness and 13 % in terms of environmental sustainability. The most frequent characteristics consumers believed products differed in were taste and quality, which were mentioned in about half of the cases[7]. All of this begs the question of what FOP elements make consumers consider a food product different, specifically in terms of healthiness and environmental sustainability, and how these affect their choices.

[6] Remember that in all cases the versions presented differed at least in two FOP attributes.

[7] Respondents could choose from one to three characteristics in which the believed the products differed. On average, they believed that products differed in 2.6 characteristics.

To shed light on this issue, the results of logistic regressions identifying the impact of differing FOP elements on the probability of considering that the products are different in product sustainability characteristics (i.e. product healthiness and environmental sustainability) are presented in Table 3[8]. In addition, we present the effect of consumers having product healthiness, environmental sustainability, and price as primary concerns in their purchases on the probability of perceiving differences in those aspects.

Focusing on purchase priorities, when consumers consider product healthiness as one of the main motives when purchasing food, this increases the probability of perceiving differences in product healthiness, holding for all products. Similarly, when consumers care about product environmental sustainability, it increases the likelihood of perceiving differences in product environmental sustainability in all products. Caring about healthiness when purchasing, also increases the probability of perceiving differences in product environmental sustainability in the pooled model and for four out the six products. In contrast, caring about product environmental sustainability does not increase the probability of perceiving differences in healthiness neither for the pooled model or any of the product specific ones. Finally, when consumers consider the price as their main purchase motive, they are less prone to consider that products vary in healthiness and sustainability, except for yoghurt and healthiness where there is no significant impact.

[8] We exclude the FOP element "position" from the regressions due to fact that when all elements are included the regression does not converge. Lack of convergence is because FOP elements are correlated as they are taken from the choice set design process created for the DCE. This element was dropped since when running regressions excluding one FOP element at a time, quality was never significant in affecting perceived differences in environmental sustainability and healthiness.

TABLE 3

Effects of key purchasing priorities and variations in packaging attributes on consumers believing product versions differ in sustainability-related product characteristics

Sustainability related product characteristic	Key purchasing priority			Front-of-pack elements							
	Price	Healthiness	Environmental sustainability	Recipe	Colour	Origin	Taste	Quality	Picture	Product description	Goodness-of-fit[a]
Healthiness											
Pooled	-0.35***	0.30***	0.20***	-0.24***	-0.03	0.32***	0.22***	0.22***	0.27***	-0.068**	Chi^2= 0.000 R^2= 0.0611 AUC=0.701
Product specific											
Instant coffee	-0.44***	0.18**	0.14	-0.46**	-0.1	0.23***	0.44**	0.023	0.49***	0.021	Chi^2= 0.000 R^2= 0.0674 AUC=0.710
Crips	-0.34***	0.30***	0.23**	-0.28	0.10*	0.14**	0.17	0.21***	0.30***	0.25***	Chi^2= 0.000 R^2= 0.0710 AUC=0.703
Baby food	-0.45***	0.24***	0.14	-0.41**	0.037	0.087	0.43***	0.19**	0.42***	-0.11	Chi^2= 0.000 R^2= 0.0636 AUC=0.692
Fish fingers	-0.38***	0.37***	0.19*	-0.0018	0.045	0.29***	0.036	0.17**	0.087	-0.029	Chi^2= 0.000 R^2= 0.0588 AUC=0.689
Chocolate	-0.40***	0.32***	0.21*	-0.61**	0.18**	0.057	0.48**	0.20*	0.64***	-0.1	Chi^2= 0.000 R^2= 0.0661 AUC=0.693
Yoghurt	-0.0072	0.49***	0.40***	-0.15	0.18**	0.78***	0.23	0.078	0.18	-0.012	Chi^2= 0.000 R^2= 0.0687 AUC=0.695
Environmental sustainability											
Pooled	-0.40***	-0.0045	0.48***	-0.22**	0.11**	0.50***	0.24***	0.087**	0.32***	-0.11***	

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Sustainability related product characteristic	Key purchasing priority			Front-of-pack elements							
	Price	Healthiness	Environmental sustainability	Recipe	Colour	Origin	Taste	Quality	Picture	Product description	Goodness-of-fit[a]
Product specific											
Instant coffee	-0.44***	-0.034	0.39***	-0.71***	-0.04	0.23***	0.72***	-0.13	0.69***	0.026	Chi^2= 0.000 R^2= 0.0554 AUC=0.689
Crips	-0.41***	-0.027	0.51***	-0.034	0.065	0.50***	0.17	0.23**	0.23	-0.46***	Chi^2= 0.000 R^2= 0.0557 AUC=0.693
Baby food	-0.40***	-0.017	0.47***	-0.32	-0.065	0.44***	0.25	0.082	0.35**	-0.092	Chi^2= 0.000 R^2= 0.0544 AUC=0.691
Fish fingers	-0.45***	0.063	0.43***	0.16	-0.056	0.58***	-0.14	0.14	0.023	-0.091	Chi^2= 0.000 R^2= 0.0524 AUC=0.684
Chocolate	-0.46***	-0.012	0.52***	-0.75***	0.028	0.11	0.50**	0.19	0.85***	-0.19	Chi^2= 0.000 R^2= 0.0742 AUC=0.712
Yoghurt	-0.23**	0.0024	0.64***	0.4	0.24***	1.40***	-0.24	0.14	-0.27*	0.14	Chi^2= 0.000 R^2= 0.0796 AUC=0.707

Robust standard errors clustered at the level of respondent ID.

**** p < 0.01, ** p < 0.05, * p < 0.10*

N = 195192 for pooled models and N = 39009 for Instant coffee, N = 39065 for Crisps, N = 38818 for Baby food, N = 39097 for Fish fingers, N = 19533 for Chocolate and N = 19670 for Yoghurt.

[a] *Likelihood Ratio (LR) Chi^2 statistic tests whether the independent variables in the model (collectively) improve the model's fit compared to a model with no predictors (the null model). It tests the null hypothesis that all the coefficients of the independent variables in the model are simultaneously equal to zero (i.e., the model with predictors is no better than a model with only an intercept). The McFadden's pseudo R^2 provides an indication of how well the model with predictors performs compared to a model without any predictors. Values closer to 1 indicate better fit. However, values of the Pseudo R-squared are typically much lower than traditional R^2 values. The AUC (Area Under the Curve) value represents the overall ability of the model to discriminate between positive and negative outcomes. An AUC of 0.5 indicates no discrimination (same as random guessing), and an AUC of 1 indicates perfect discrimination. Note that the corresponding ROC Curve is a graphical plot that illustrates the diagnostic ability of a binary classifier. It plots the True Positive Rate (Sensitivity) against the False Positive Rate (1 - Specificity).*

Source: Own elaboration based on survey responses.

Looking at specific FOP elements and considering all products pooled, four of them (claims related to origin, taste and quality, and change in the picture displayed) increases the probability of consumers considering the products differ in both healthiness and environmental sustainability. Therefore, if there is no value action gap, consumers considering these priorities key when purchasing should have a higher valuation for that FOP elements. In addition, a change in the colour of the package leads consumers to belief that product versions differ in terms of environmental sustainability.

Digging into product specific effects, we can see that the pattern holds for most of the products in the case differences in healthiness. In addition, the change in colour signals difference in healthiness for crisps, chocolate and yoghurt. However, for environmental sustainability the effect of the quality claim only signals this difference for crips and the change in colour for yoghurt. The differences between products may be driven not only by the product itself but also by differences in the specific implementation of each element (e.g. text, logo, image) in each product and what they convey. For instance, the picture of the cup of coffee in the instant coffee may not be comparable with the picture of a cow grazing in the meadows in the chocolate bar. Therefore, understanding the meaning consumers attach to each specific element appears essential in understanding food choices.

Focusing on country and product specific results (using the results of 50 individual country-product specific models, not reported), we see that when consumers are concerned about the purchase price, they have a lower probability of perceiving products to be different regarding product healthiness and environmental sustainability in all countries for all tested products. Moreover, in line with the results pooled by country, if consumers are concerned about product healthiness (environmental sustainability), they have a higher probability of perceiving differences in product healthiness (environmental sustainability) for at least one product in all countries. The only exceptions are Czechia and Italy where no significant impact was found for environmental sustainability and probability of inferring product pairs differed in that characteristic.

In Table 4 we summarise the results for FOP elements that signal differences in product healthiness. A first striking result is that in Austria for none of the products does any of the FOP elements considered have a significant impact on the probability of inferring differences in healthiness between two products. In contrast, in the rest of counties, consumers perceive differences between product versions from two (DE, NL) to five (LH) products signalled by one or two attributes. In total we find 51 instances in which a FOP element signals such decision across all products. The FOP element that more frequently has an impact on the probability of inferring differences in product healthiness is the picture used in the package (significant in 15 out of the 50 country-product pairs) followed by the claim on origin and taste (significant in 11 and 10 out of the 50 country-product pairs respectively). On the other hand, for only two of the country-product pairs do we find a significant impact of the recipe claim on the probability of inferring differences in product healthiness.

TABLE 4

FOP elements signalling differences in product healthiness by country and product

	Instant coffee	Crisps	Baby food	Fish fingers	Chocolate	Yoghurt
Austria						
France		Picture (1)		Origin (1) Quality (2)	Picture (1)	
Romania	Taste (1) Picture (2)	Picture (1)			Colour (1) Taste (2) Picture (3)	
Czechia		Origin (1) Quality (2)	Picture (1)	Quality (1)	Colour (1) Taste (2) Picture (3)	
Italy	Origin (1) Picture (2)	Taste (1) Picture (2)	Taste (1)	Origin (1)	Picture (1)	
Germany		Recipe (1) Quality (2)				Colour (1)
Netherlands			Colour (1) Name (2)			Origin (1)
Lithuania	Picture (1)	Taste (1) Picture (2) Quality (3)	Origin (1) Quality (2)	Origin (1) Quality (2)		Origin (1)
Poland				Taste (1) Picture (2)		Recipe (1) Origin (2)
Spain		Name (1)	Taste (1) Picture (2) Quality (3)	Colour (1) Origin (2)		Origin (1) Taste (2) Picture (3)

Source: Own elaboration based on survey responses.

The same information for environmental sustainability is summarised in Table 5. For this characteristic in all countries all FOP elements considered have a significant impact on the probability of inferring differences in environmental sustainability between two products versions for at least two products (FR). For the remaining nine countries consumers perceive differences between product versions for three (IT, CZ) or more products signalled by one, two or three attributes. In total we find 55 instances in which a FOP element signals such decision across all products. The FOP element that more frequently has an impact on the probability of inferring differences in environmental sustainability is the claim on origin (significant in 27 out of the 50 country-product pairs) followed by the picture used in the package (significant in seven out of the 50 country-product pairs).

This reveals something important for policymakers and food companies by confirming the diversity between countries in how they perceive the attributes on a package and the meaning they attach to them, with potential different implications for food choices in each country.

TABLE 5

Attributes signalling differences in product environmental sustainability by country and product

	Instant coffee	Crisps	Baby food	Fish fingers	Chocolate	Yoghurt
Austria	Origin (1)	Origin (1)		Origin (1) Quality (2)	Taste (1) Picture (2)	
France			Colour (1)		Origin (1)	
Romania	Taste (1) Picture (2)		Origin (1)	Origin (1)	Colour (1) Quality (2)	
Czechia	Taste (1)	Origin (1)	Origin (1) Taste (2) Picture (3)			
Italy		Origin (1)	Origin (1) Picture (2)	Origin (1)		
Germany	Origin (1) Taste (2) Picture (3)	Origin (1)		Origin (1)		Origin (1)
Netherlands	Origin (1)	Origin (1) Quality (2)	Origin (1)	Origin (1)		Colour (1) Origin (2)
Lithuania	Taste (1) Picture (2)	Origin (1) Picture (2) Quality (3)	Origin (1)			Origin (1)
Poland	Origin (1)	Quality (1)	Name (1)			Recipe (1) Origin (2) Quality (3)
Spain	Taste (1) Picture (2)	Colour (1)	Origin (1)	Origin (1)		Colour (1) Origin (2)

Source: Own elaboration based on survey responses.

3.2. Utility and willingness to pay

The results of the conditional logit models are reported in Table 6, the product specific models include the interaction of the sustainability related purchasing priorities with the FOP elements signalling differences in them[9]. We also include the interaction with the price variable to better understand how prioritizing sustainability affects decisions.

While not the focus of the paper, we see that overall, most FOP elements affected consumer choices (45 out of 48 product specific FOP element coefficients are significant). The coefficients that fail to affect consumer choices are mainly tweaks (change in the colour or position of the picture), however these were the ones that made differences in packages more salient (Solano-Hermosilla *et al*., 2023). The presence of any claim is associated with a higher utility (all coefficients are positive) and the impact on utility of changes in tweaks are product specific. The negative sign of the price attribute reflected that consumers preferred less expensive food products and the significant and negative no buy coefficient shows that consumers prefer purchasing the product rather than not.

Focusing on the relevant coefficients for our study's objective, we see that consumers declaring that they have among their three top priorities for food purchases environmental sustainability mostly (seven out of eleven) show differences in their valuation of FOP attributes that signal it[10]. The lack of significance for the interaction between prioritising environmental sustainability and the FOP for image and chocolate or baby food means that consumers caring for this characteristic do not have different valuation for those product versions with FOP that signals it from those consumers who do not care for it. The same happens for claims focusing on quality for crips and for claims focusing on taste for chocolate. However, in general we can conclude that the environmental sustainability related values mostly translate into actions by changing the value attached to FOP elements that signal differences in this characteristic. On the contrary, we fail to find such a consistent pattern for healthiness as in only six out of 20 interactions capturing prioritizing healthiness and FOP elements that signal differences in healthiness of the product are positive and significant. Moreover, we find two instances where there is a negative and significant interaction.

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[9] As mentioned, the model includes a three-way interaction (FOP element, sustainability related purchase motive declared important, attribute signalling differences in the sustainability related aspect), however only the interactions for the attributes signalling differences are reported as for the others the interaction takes value 0. Importance given to purchase motive is an individual specific variable, while the attribute signalling differences in the sustainability related aspect is taken at the product level when reporting pooled models or at the product-country level when reporting country specific models.

[10] We consider only positive and significant coefficients as the change in them affects the probability of products differing in healthiness and environmental sustainability.

However, this translation of values to actions seems to happen when looking to sensitivity to price. The interaction of prioritising healthiness and price is positive and significant for three of the six products, the exceptions being crisps, fish fingers and chocolate. Implying that the translation of the importance given to health makes consumers less sensitive to price rather than value more FOP elements that might signal healthiness. The fact that crisps and chocolate are probably the least healthy products of the tested could explain the lack of significance. This effect is only found for crisps when focusing on the priority given to environmental sustainability.

Table 6, also reports the WTP for each FOP elements and the change in WTP for FOP elements that signal sustainability for consumers that give sustainability aspects a key role in their food purchases.

The WTP reflects how much consumers were willing to pay for a level change of the attribute. For example, overall, consumers were willing to pay 0.06 € more for the presence of a claim on the origin of the ingredients in the crisps packs than for those without the claim. For crisps, our analysis shows that the presence of the origin claims signals that products differ in their environmental sustainability (see Table 3). So, if the product's environmental sustainability was key for consumers, they were willing to pay 50 % more (3 more euro cents). On average, the change in willingness to pay for FOP elements when consumers consider as priority the product characteristic they signal is 30 % of the stand-alone value of the FOP element. This impact ranges from a maximum of 70 % for the case of a change in picture signalling environmental sustainability in instant coffee and a minimum of 4 % for the case of the presence of an origin claim signalling healthiness in yoghurt.

Besides the heterogeneity from a product perspective, when translating values into actions one could consider that there are also differences driven by culture. For this, we run 50 individual models for each country-product pair and report the interactions of interest in Table 7 and Table 8. In this analysis, contrary to Table 6, the capacity to signal differences in sustainability is based also on country and product specific regressions rather than on pooled regressions per product. The specific FOP elements which significantly affect differences for both environmental sustainability and health for each country/product pair are those summarised in Table 4 and Table 5.

TABLE 6

Conditional logit estimates for the impact of (a) FOP elements and prices, (b) interactions between purchase priorities and prices, and (c) interactions between purchase priorities and FOP signalling sustainability on consumer choices and willingness to pay

a) FOP elements and price as predictors

Variables	Instant coffee		Crisps		Baby food		Fish fingers		Chocolate		Yoghurt	
	Choice	WTP	Choice	WTP	Choice	WTP	Choice	WTP	Choice	WTP	Choice	WTP
Attributes												
No buy	-4.93***	-5.41***	-4.56***	-0.964***	-4.04***	-0.861***	-4.76***	-2.394***	-3.70***	-1.694***	-5.36***	-1.979***
	(-0.2)		(-0.13)		(-0.13)		(-0.12)		(-0.17)		(-0.17)	
Price	-0.91***		-4.73***		-4.69***		-1.99***		-2.19***		-2.71***	
	(-0.04)		(-0.17)		(-0.16)		(-0.06)		(-0.17)		(-0.11)	
Origin	0.28***	0.306***	0.23***	0.049***	0.30***	0.064***	0.30***	0.153***	0.25***	0.115***	0.45***	0.166***
	(-0.024)		(-0.023)		(-0.025)		(-0.023)		(-0.033)		(-0.031)	
Taste	0.16***	0.177***	0.11***	0.023***	-0.025		0.11***	0.057***	0.028		-0.073**	-0.027**
	(-0.016)		(-0.019)		(-0.016)		(-0.016)		(-0.031)		(-0.032)	
Quality	0.39***	0.422***	0.28***	0.060***	0.48***	0.102***	0.42***	0.209***	0.23***	0.104***	0.64***	0.237***
	(-0.024)		(-0.019)		(-0.017)		(-0.019)		(-0.024)		(-0.027)	
Recipe	0.56***	0.616***	0.40***	0.085***	0.49***	0.105***	0.43***	0.216***	0.26***	0.12***	0.40***	0.147***
	(-0.048)		(-0.032)		(-0.035)		(-0.032)		(-0.046)		(-0.043)	
Colour	0.47***	0.513***	0.37***	0.079***	0.48***	0.102***	0.36***	0.180***	0.24***	0.108***	0.25***	0.092***
	-0.033)		(-0.026)		(-0.027)		(-0.025)		(-0.034)		(-0.031)	
Picture	0.13***	0.144***	-0.0058		0.098***	0.021***	0.012		-0.42***	-0.191***	0.078***	0.029***
	(-0.034)		(-0.023)		(-0.021)		(-0.016)		(-0.029)		(-0.025)	
Position	0.016		-0.02		-0.022		-0.030*	-0.015**	0.065***	0.03***	-0.12***	-0.045***
	(-0.015)		(-0.014)		(-0.016)		(-0.016)		(-0.023)		(-0.022)	
Product description	-0.048*	-0.053*	0.12***	0.025***	-0.11***	-0.023***	0.20***	0.099***	-0.11***	-0.05***	-0.31***	-0.116***
	(-0.029)		(-0.022)		(-0.018)		(-0.018)		(-0.027)		(-0.025)	

b) Interactions between purchase priorities and price as predictors of choices and WTP

Variables	Instant coffee		Crisps		Baby food		Fish fingers		Chocolate		Yoghurt	
	Choice	WTP	Choice	WTP	Choice	WTP	Choice	WTP	Choice	WTP	Choice	WTP
Purchase priorities x price												
Environmental sustainability	-0.021*	-0.023*	0.19***	0.040***	0.03		-0.036		-0.029		-0.031	
	(-0.012)		(-0.069)		(-0.063)		(-0.024)		(-0.074)		(-0.05)	
Healthiness	0.018**	0.02**	-0.066		0.089*	0.019**	0.015		0.0013		0.061**	0.023***
	(-0.0077)		(-0.053)		(-0.048)		(-0.017)		(-0.065)		(-0.031)	

c) Interactions between purchase priorities and FOP elements signalling sustainability as predictors of choices and WTP

Variables	Instant coffee		Crisps		Baby food		Fish fingers		Chocolate		Yoghurt	
	Choice	WTP	Choice	WTP	Choice	WTP	Choice	WTP	Choice	WTP	Choice	WTP
Healthiness priority x attributes signalling it												
Recipe												
Colour												
Origin			-0.032						0.062		0.036	
			(-0.028)						(-0.046)		(-0.042)	
Taste	0.0068		0.01				-0.0021				0.034	
	(-0.027)		(-0.026)				(-0.027)				(-0.034)	
Quality	-0.053*	-0.059*			0.034				**0.095***	**0.043***		
	(-0.032)				(-0.034)				(-0.052)			
Picture			**0.090*****	**0.019*****	**0.078****	**0.017****	**0.049***	**0.024***	**0.15*****	**0.069***		
			(-0.026)		(-0.031)		(-0.026)		(-0.043)			
Product description	0.0041		**0.076****	**0.016****	-0.064**	-0.014**			-0.095**	-0.043**		
	(-0.032)		(-0.03)		(-0.029)				(-0.04)			
Position			0.01									
			(-0.032)									

Variables	Instant coffee		Crisps		Baby food		Fish fingers		Chocolate		Yoghurt	
	Choice	WTP	Choice	WTP	Choice	WTP	Choice	WTP	Choice	WTP	Choice	WTP
Environmental sustainability priorities x attributes signalling it												
Recipe												
Colour											**0.27***	**0.1***
											(-0.067)	
Origin	**0.091****	**0.1****	**0.14*****	**0.030*****	**0.15*****	**0.033*****	**0.14*****	**0.070*****			**0.21*****	**0.077****
	(-0.043)		(-0.04)		(-0.042)		(-0.043)				(-0.056)	
Taste	0.073								0.014			
	(-0.05)								(-0.059)			
Quality			-0.045									
			(-0.039)									
Picture	**0.082***	**0.09***			-0.016				-0.047			
	(-0.049)				(-0.045)				(-0.061)			
Product description												
Position												
Observations (#choices)	116,976		117,150		117,081		117,144		58,281		58,944	
LR Chi^2	0.000		0.000		0.000		0.000		0.000		0.000	
McFadden's pseudo R^2	0.0605		0.0935		0.0549		0.0740		0.1048		0.1135	

Notes: Robust standard errors clustered at the level of respondent ID in parentheses; coefficients in bold: supports coherence between stated priorities and choices; shaded cells: does not support coherence between stated priorities and choices.

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Source: own elaboration based on survey responses.

While we see significant heterogeneity when considering these 50 models we see how the findings for the EU-wide pooled models mostly replicate. The interaction between price and the two purchase motives is more often significant and positive for the case of healthiness than for environmental sustainability, with Spain being a case where this pattern reverses. We also see that positive and significant interactions between purchase motives and FOP elements that signal that motive is more frequent for environmental sustainability than for healthiness, 15 % and 35 % of the interactions respectively. However, at the country-product level we see that the value action gap is more acute as the number of significant interactions is lower than the insignificant ones for both purchase priorities. Nevertheless, we do see constantly that translation of values into action happens via one of two ways and never via both. When consumers prioritise one of the two sustainability domains studied, they are either less sensitive to price or value attributes that signal it more highly but not at the same time for the same product.

TABLE 7

Estimated coefficients for interaction of purchase priorities and price and FOP attributes that signal sustainability on consumer choices

1) Interactions between purchase priorities and prices

	AT	FR	RO	CZ	IT
Healthiness purchase priority * price					
Instant coffee	0.025	0.021	0.0092	0.025	0.017
Crisps	0.22*	0.2	-0.078	-0.098	-0.31*
Baby food	0.35***	0.18	0.067	0.21*	-0.22
Fish fingers	0.12**	0.14**	-0.0026	-0.088*	-0.091
Chocolate	0.19*	0.099	-0.035	-0.11	0.048
Environmental sustainability purchase priority * price					
Instant coffee	0.003	0.024	-0.019	-0.068*	0.066***
Crisps	0.17	0.17	-0.073	-0.15	-0.12
Baby food	0.051	0.18	0.22	-0.4	0.33*
Fish fingers	-0.21***	-0.0052	0.21	0.0037	0.039
Chocolate	0.12	0.35**	-0.16	-0.14	-0.092

TABLE 7 (CONT.)

Estimated coefficients for interaction of purchase priorities and price and FOP attributes that signal sustainability on consumer choices

2) Interactions between purchase priorities and FOP elements signalling sustainability

	AT			FR			RO			CZ			IT		
Healthiness purchase priority * attributes signalling healthiness															
	Att. 1	**Att. 2**	**Att. 3**	**Att. 1**	**Att. 2**	**Att. 3**	**Att. 1**	**Att. 2**	**Att. 3**	**Att. 1**	**Att. 2**	**Att. 3**	**Att. 1**	**Att. 2**	**Att. 3**
Instant coffee							-0.058	-0.093					-0.15*	-0.07	
Crisps				0.038			-0.016			0.042	0.26***		0.08	0.024	
Baby food				0.14						-0.075			0.16		
Fish fingers				-0.091	-0.043					0.28***			-0.028		
Chocolate				-0.066			0.058	-0.17**	0.13	0.0051	0.036	0.035	-0.095		
Environmental sustainability purchase priority * attributes signalling it															
	Att. 1	**Att. 2**	**Att. 3**	**Att. 1**	**Att. 2**	**Att. 3**	**Att. 1**	**Att. 2**	**Att. 3**	**Att. 1**	**Att. 2**	**Att. 3**	**Att. 1**	**Att. 2**	**Att. 3**
Instant coffee	0.19*						0.27	0.22		0.037					
Crisps	0.19*									0.25			0.15		
Baby food							0.015			0.053	0.077	-0.12	0.063	-0.0014	
Fish fingers	0.29**	0.20*					-0.31*						0.037		
Chocolate				-0.49***			-0.016	0.24							

Information on which FOP element is labelled as attribute #1, #2 and #3 can be found in Tables 4 and 5.

**** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$*

Source: own elaboration based on survey responses.

TABLE 8

Estimated coefficients for interaction of purchase priorities and price and FOP attributes that signal sustainability on consumer choices

1) Interactions between purchase priorities and prices

	DE	NL	LT	PL	ES
Healthiness purchase priority * price					
Instant coffee	**0.022**	**-0.027***	**-0.025**	**-0.0045**	**0.029**
Crisps	**-0.066**	**-0.26****	**-0.35****	**-0.17**	**-0.092**
Baby food	**0.21***	**-0.11**	**0.099**	**0.16**	**0.14**
Fish fingers	**0.067**	**-0.059**	**0.0077**	**0.052**	**-0.064**
Yoghurt	**0.051**	**0.02**	**0.018**	**-0.019**	**0.13**
Environmental sustainability purchase priority * price					
Instant coffee	**-0.045**	**-0.018**	**0.029**	**0.014**	**0.11*****
Crisps	**-0.067**	**-0.055**	**0.42**	**0.36**	**0.69*****
Baby food	**0.088**	**-0.12**	**0.43**	**0.96*****	**0.45****
Fish fingers	**-0.066**	**-0.064**	**0.021**	**0.16***	**0.037**
Yoghurt	**-0.095**	**-0.04**	**0.33****	**0.12**	**0.048**

TABLE 8 (CONT.)

Estimated coefficients for interaction of purchase priorities and price and FOP attributes that signal sustainability on consumer choices

2) Interactions between purchase priorities and FOP elements signalling sustainability

	DE			NL			LT			PL			ES		
Healthiness purchase priority * attributes signalling healthiness															
	Att. 1	**Att. 2**	**Att. 3**	**Att. 1**	**Att. 2**	**Att. 3**	**Att. 1**	**Att. 2**	**Att. 3**	**Att. 1**	**Att. 2**	**Att. 3**	**Att. 1**	**Att. 2**	**Att. 3**
Instant coffee							0.15								
Crisps	0.13	0.026					0.11	0.11	0.26***				0.24**		
Baby food				-0.0082	-0.049		0.18**	0.029					-0.018	-0.11	0.14
Fish fingers							0.15*	0.11		0.021	-0.19**		0.027	-0.048	
Yoghurt	-0.1			-0.12			0.12*			0.018	0.19**		-0.005	-0.14*	-0.018
Environmental sustainability purchase priority * attributes signalling it															
	Att. 1	**Att. 2**	**Att. 3**	**Att. 1**	**Att. 2**	**Att. 3**	**Att. 1**	**Att. 2**	**Att. 3**	**Att. 1**	**Att. 2**	**Att. 3**	**Att. 1**	**Att. 2**	**Att. 3**
Instant coffee	-0.048	0.32**	0.36***	0.48***			0.092	0.22		0.56***			0.061	-0.18	
Crisps	0.15			0.30**	0.14		0.017	-0.25		0.29*			-0.004		
Baby food				0.50***			-0.0036			-0.17			0.17		
Fish fingers	0.49***			0.52***									-0.046		
Yoghurt	0.18*			0.30**	0.48***		-0.095			0.38**	0.25	0.34*	0.075	0.31**	

Information on which FOP element is labelled as attribute #1 and #2 can be found in Tables 4 and 5.

**** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$*

Source: own elaboration based on survey responses.

4. Discussion

This study has examined whether consumers' values about product sustainability, as reflected by their stated purchasing priorities translate into their food purchasing choices. Specifically, the study aimed to determine if consumers attach a higher value to FOP elements signalling differences in sustainability when they declare that sustainability is one of the key motives when purchasing food. The findings are based on an online survey, including a DCE, run in 10 EU countries for six products and eight FOP elements. Consumers were confronted with different versions of packages and asked: (i) whether they believed packages shown to them were the different; (ii) whether they believed that the versions of the products in the packages were different, and (iii) for what product characteristic they differed. In a second step and including price information for the different package versions they were asked to choose which product they would purchase (or none) if they found them in their regular supermarket.

When considering the interplay of purchase priorities and attributes, the first result relates to the impact of sustainability related priorities when buying food on price sensitivity. The results show that when purchase decisions are driven by environmental sustainability, this translates into lower sensitivity to price only for one product (crisps). In other words, this seems to indicate that, although consumers claim to prioritize environmental sustainability when purchasing food products, they are ultimately driven by price. On the other hand, the interaction of price with priority healthiness is significant for three out of the six products. This means that if consumers prioritise healthiness when purchasing food, this reduces the attention given to price, and therefore consumers show choice patterns consistent with changing the way they trade-off healthiness and cost. This is particularly relevant as price is one of the top-3 barriers declared by consumers when purchasing healthy (Briazu *et al*., 2024; Domosławska-Żylińska *et al*., 2023). Moreover, the products for which the effect is not significant (crisps, fish fingers and chocolate) are the least healthy ones in our product selection. Therefore, we see a smaller value action gap for products that align with the specific values we measure, a pattern already reported by Plasek *et al*. (2021). However, the results vary not only by product but also by country. Cultural differences in values and beliefs may lead to distinct trade-offs in priorities and attitudes toward purchasing sustainable food products. This underscores the need for tailored marketing strategies by companies and targeted policies by governments at the country level (Pucci *et al.*, 2022).

Regarding the significance of the interactions between purchase priorities and FOP elements signalling those priorities, we can see that for product healthiness, we find often that interactions for those which signal the difference in that characteristic are not significant. Moreover, we also find three cases where the interaction lowers the valued attached to the FOP element. However, when focusing on sustainability, consumers do show a coherent behaviour between declared purchase priorities and valuation of FOP attributes that signal differences in sustainability between products,

except for the case of chocolate. This could be a driver behind the experimental evidence that shows that sustainability claims are valued higher than health ones (Banovic *et al*., 2019). But, again, results vary by product and country, highlighting the importance of looking at the country and differences in culture, values and beliefs in understanding consumers' perceptions and choices.

Last, the fact that the way the value action gap is mitigated across domains is in line with experimental evidence that shows that the value action gap is more relevant when the attributes signalled have a less immediate effect (Hoffmann *et al*., 2024). In this case considering the impact on environmental sustainability as a more distant effect that the impact on health we see that there is a direct impact on price sensitivity for health while the impact is channelled via FOP attributes for the more distant effects.

5. Concluding remarks

In conclusion, overall, we see that declared importance for product healthiness changes the importance given to price when purchasing food, and the relationship is more robust for healthier products. However, this effect comes at the cost of consumers not changing the way they value specific FOP elements that signal healthiness. On the other hand, focusing on environmental sustainability, the reverse occurs. Sensitivity to price does not seem to be affected by declaring that product environmental sustainability is a priority when purchasing food products. However, it does lead to a higher valuation of products where FOP elements that signal environmental sustainability are present.

Therefore, self-declared purchase motives translate into consumer choices when focusing on health without the need of specific FOP elements that signal difference in healthiness. However, when focusing on environmental sustainability, food producers need to signal increased sustainability in their products if they want to see an impact on consumers' choices. When moving from pooled data to country specific analysis we see that each FOP element is perceived and signal different product characteristics by country and product. Also, interactions between purchase motives and product attributes (including price) affect purchase choices differently across countries. These results can help policymakers and agri-food companies design labelling, marketing, and awareness strategies, as well as behavioural interventions building on the relationship identified between values, perception and purchases. To move towards healthier diets awareness will be enough as this could overcome the barrier for following healthier diets as they are more expensive (Bai *et al.*, 2021) or perceived as more expensive (Haws *et al*., 2017) via lowering price sensitivity. However to move towards environmentally more sustainable diets, signalling the environmental sustainability characteristics of the products will be needed.

Of course, we are aware about the limitations of the methods used in this study. The main limitation is that the products were hypothetical and not real products available

in the market. However, to overcome this, we tried to make the designs as realistic as possible, and they were tested in focus groups and adjusted accordingly. On the other hand, the advantage of being hypothetical is that they can be designed as necessary to address the research questions. For example, all the attributes established in the experimental design could be tested without copyright limitations. Moreover, the translation of value to behaviour was only tested in relationship with stated behaviour as the DCE was not incentivized. Our estimation strategy, combining responses to different sections of the questionnaire, minimizes the risk of results being an artefact of salience or compliance bias (Bordalo *et al*., 2013), however the hypothetical nature of purchase decisions remains a limitation. Confirming whether the last gap between stated and revealed behaviour is also closed when dealing with healthiness and environmental sustainability remains a challenge to be addressed.

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ANNEX A

Sample socio-demographic characteristics

	CZ	DE	ES	FR	IT	LT	NL	AT	PL	RO	Total
Total sample	**2,032**	**2,007**	**2,008**	**2,005**	**2,004**	**2,022**	**2,008**	**2,008**	**2,019**	**2,020**	**20,133**
Gender* **											
Female (%)	50.1	52.4	48.0	54.2	52.3	54.0	52.8	47.4	54.3	48.7	51.4
Male (%)	50.0	47.6	52.0	45.8	47.8	46.0	47.2	52.6	45.7	51.3	48.6
Age group (years)* **											
18-34 (%)	22.2	21.7	23.3	24.6	21.1	30.7	24.1	27.5	26.8	26.7	24.9
35-54 (%)	38.0	32.4	40.8	33.5	35.5	38.6	33.2	37.2	36.0	43.1	36.8
55-65 (%)	17.1	20.1	18.4	18.3	19.0	21.4	19.1	20.1	18.8	18.1	19.1
>65 (%)	22.7	25.7	17.5	23.5	24.4	9.3	23.7	15.2	18.5	12.1	19.3
Income group* **											
Very low income (%)	7.5	13.1	5.8	10.3	4.7	6.1	10.8	18.1	3.9	2.1	8.2
Low income (%)	6.9	9.8	7.2	9.2	11.9	8.5	8.8	11.9	4.4	2.5	8.1
Medium income (%)	7.6	11.5	17.0	12.5	16.7	10.4	13.4	14.3	7.5	3.9	11.5
High income (%)	14.8	16.6	16.8	17.6	18.7	19.2	14.2	16.8	14.8	11.5	16.1
Very high income (%)	55.6	40.6	44.7	41.6	35.4	44.3	33.3	27.3	59.7	74.1	45.7
Prefer not to answer (%)	6.1	7.3	6.3	7.0	9.9	9.8	15.1	9.7	7.0	4.1	8.2
Don't know (%)	1.5	1.3	2.1	1.9	2.7	1.7	4.5	1.9	2.8	1.8	2.2
Household's number of adults (age 18+)* **											
1 adult (%)	21.0	31.2	10.3	22.1	13.6	21.2	29.3	28.1	12.6	12.3	20.2
2 adults (%)	60.0	57.0	56.7	62.4	52.6	57.9	55.8	54.1	59.2	57.9	57.4
>2 adults (%)	19.0	11.8	33.0	15.4	33.8	20.9	14.9	17.8	28.2	29.8	22.5
Household's number of children (age 6-17)* **											
No children (%)	77.4	81.6	68.4	73.8	74.3	72.8	81.9	80.6	70.9	73.8	75.5
1 child (%)	14.2	13.7	21.5	15.4	16.0	17.3	10.7	12.8	19.9	19.5	16.1
2 children (%)	7.5	3.8	9.3	8.7	8.2	8.3	6.0	5.5	8.1	6.0	7.2
>2 children (%)	0.8	0.9	0.8	2.1	1.6	1.6	1.5	1.1	1.1	0.7	1.2
Household's number of children (age 0-5) * **											
No children (%)	85.6	91.9	88.8	90.0	90.8	89.8	92.2	90.0	83.6	90.7	89.3
1 child (%)	11.1	6.7	9.4	7.8	8.0	8.0	6.2	8.1	13.3	8.2	8.7
2 children (%)	3.2	1.1	1.6	2.0	1.2	1.8	1.4	1.3	2.9	0.8	1.7
>2 children (%)	0.2	0.4	0.2	0.2	0.1	0.5	0.2	0.6	0.2	0.3	0.3

*Note: Sample representative at the country level was assured by the quota sampling of the data provider from their panels. CZ: Czechia, DE: Germany, ES: Spain, FR: France, IT: Italy, LT: Lithuania, NL: Netherlands, AT: Austria, PL: Poland; RO: Romania, ***p < .01; p-values are the result of Chi-square tests of independence of a categorical variable (e.g. age) across countries, indicating whether they are likely to be related or not. The Null hypothesis is that they are independent. Please note that differences across countries are to be expected, as the populations from which the samples are extracted are not necessarily the same (e.g. the age structure is not the same in Latvia and Austria).*

Source: own elaboration based on survey data.