

Sustainably produced butter: The effect of product knowledge, interest in sustainability, and consumer characteristics on purchase frequency

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Abstract: Understanding buying behaviour for sustainable products is important for food producers and distributors. This study aims to examine the effect of knowledge of the product, interest in sustainability, and characteristics of consumers on the frequency of buying sustainably produced butter using the Stimulus-Organism-Response (SOR) model. In this study, two different types of butter were used, one produced by a well-known brand and the other by a less-known dairy. Data were collected through a structured online survey of 825 respondents from Poland. The research found that knowledge about the product and the sustainability-related product attributes does not positively influence the frequency of purchasing sustainable butter. The results indicate that consumers living in smaller towns, having higher incomes and smaller households, are more frequent buyers of sustainably produced butter.

Keywords: buying behaviour; multinomial logistic regression; Stimulus-Organism-Response model; traditional food

The choice of a food product is a complicated process since there is a diverse and vast range of food products available on the market (Ruso et al. 2021). Numerous articles aim to segment the food market (D'Souza et al. 2021; Hrubá and Sadílek 2021; Casas-Rosal et al. 2022) and thus indicate the importance of various food attributes in consumer preference. Sustainability is becoming increasingly important

in consumer food choices. Sustainable food production can be characterized as 'a method of production using processes and systems that are not polluted, conserve nonrenewable energy and natural resources, are economically efficient, are safe for workers, communities and consumers, and do not compromise the needs of future generations' (Foresight 2011). Sustainable products can be defined as products with positive

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social and/or environmental attributes, and these attributes may include sustainability labels (e.g. organic, fair-trade, non-GMO) (Del Giudice et al. 2018), narrative claims (Lemken et al. 2017), and packaging (Herbes et al. 2018). To date, little research has focused on traditional food products (TFP) as an example of sustainable products (Kalenjuk Pivarski et al. 2022). Therefore, traditional food can be identified to some extent with 'sustainable food'. In some cases, it can ensure food security (Deaconu et al. 2021). Promotion and protection programmes (e.g. geographical indications) that affect TFP provide a basis for sustainability due to the relationship with the origin and 'the reproduction of local resources' (Vandecandelaere et al. 2018). In terms of social sustainability, traditional food production can contribute to rural development. The specific characteristics of TFPs, their relationship to the heritage of a location, and the mode of production lead to specific limits in production processes and are important elements of sustainable development (Florek and Gazda 2021). From an environmental sustainability perspective, selling through short supply chains to local markets is more sustainable because it involves less transport, may require less packaging and reduces food losses that otherwise occur at the production and retail stage (Tasca et al. 2017). Given the potential importance of traditional food attributes in communicating the sustainability performance of products, further empirical studies are needed that examine the potential role of these attributes in driving consumer purchase decisions towards sustainable food products. There is also little knowledge on how simple incentives affect the frequency of sustainable food purchases. Given the gap in the literature on sustainably produced butter, this paper aims to contribute to a better understanding of consumer purchase behaviour. The decision to choose this product is based on several reasons. To meet changing consumer needs in the food market, research is needed on consumer preferences for sustainably produced butter and the segmentation of consumers pertaining to their preferences. The COVID-19 pandemic limited food service offers and many consumers stayed home for extended periods of time, forcing them to return to their kitchen to prepare meals. This resulted in a higher demand for butter and spreads as people turned to cooking and baking. In line with the increasing demand for butter, local dairy producers strengthened their positions during the lockdown (Euromonitor International 2020). There is a lack of detailed literature on butter, especially sustainably produced butter. The only carried-out studies

focused on product characteristics and consumer preferences using a sensory analysis (Trinh et al. 2019).

This paper focuses on the influence of the sociodemographic environment of consumers, product knowledge, and sustainability on the frequency of purchasing sustainably produced butter. It attempts to answer the following research question: What is the impact of the sociodemographic environment of consumers, product familiarity, and sustainability on shaping consumer preferences regarding the purchase of sustainably produced butter?

Stimulus-Organism-Response model. In the consumer behaviour literature, behaviouristic and neo-behaviouristic approaches can be found to explain consumer behaviour. Neobehaviouristic models as opposed to behaviouristic models focus on unobservable, internal processes (i.e. activation and cognition) to conceptualize purchase decisions (Lee and Yun 2015). The neobehaviouristic approach is comprised of the stimulus (S), organism (O) and response (R) paradigm in which environment stimulus (S) results in emotional response (O), thereby fostering behavioural response (R) (Mehrabian and Russell 1974). The Stimulus-Organism-Response (SOR) model is a structural model that combines observable and unobservable variables and places a strong focus on the organism. A stimulus is an environmental cue that encourages the behavioural intention of an individual (Zafar et al. 2020) (Figure 1).

Product knowledge. Product knowledge is defined in terms of cognitive structures of knowledge that come from direct or indirect experiences related to the product stored in memory (Nguyen et al. 2015). The consumer's prior experience with the product is a variable that can influence product recall and recognition. This includes direct experiences, such as using a product because it was purchased, or indirect experiences, such as being exposed to the product because it spontaneously appears around us (Martí-Parreño et al. 2017). Some scholars often substitute knowledge with familiarity, because both terms indicate a cognitive structure that results from product-consumer relations (Jeng 2017). Well-known brands offer safety and known benefits, while new brands provide a sense of freshness and change (Karpinska-Krakowiak 2021). Previous research has also shown that when consumers are familiar with a product, they retain much more information than with unfamiliar products, and use it to make decisions (Martí-Parreño et al. 2017). Product knowledge positively influences the frequency of purchase of sustainable food products (Cicia et al. 2021). Therefore, the first hypothesis was developed as follows:

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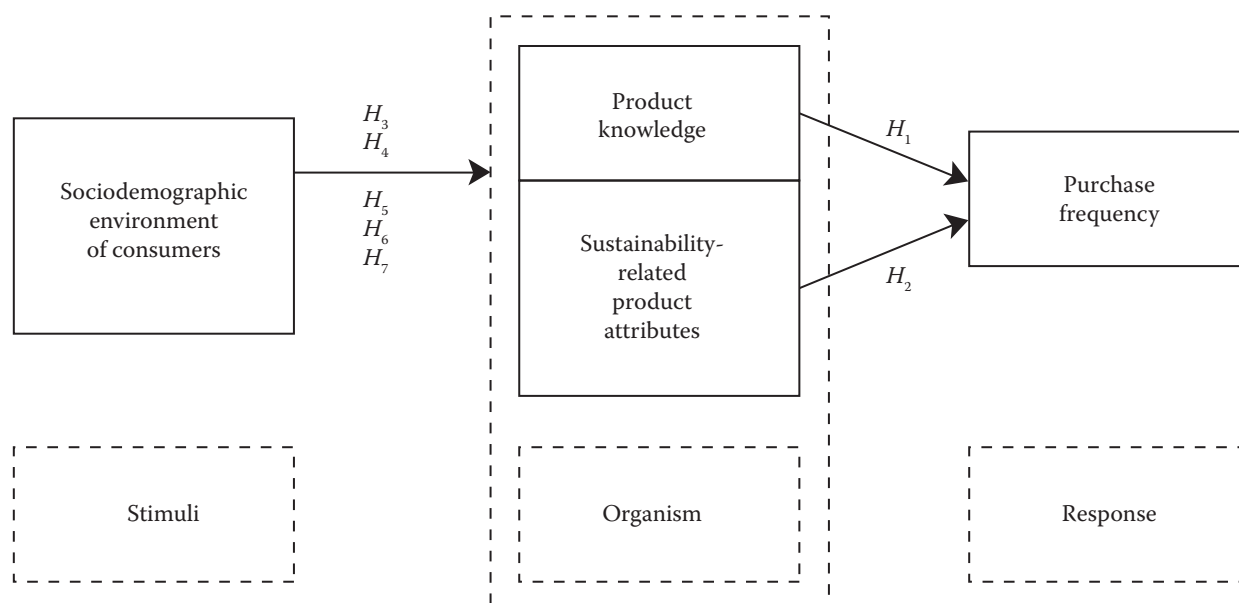


Figure 1. Proposed research model

H_1 – H_7 – research hypotheses

Source: Own elaboration

H_1 : Knowledge about the product has a positive effect on the purchase frequency of sustainable butter.

The sustainability-related attributes of traditional food products. The value that traditional food products (TFP) have for consumers was highlighted in the literature and European regulations (Sadílek 2019). TFPs are those 'transmitted from one generation to another, made in a specific way according to gastronomic heritage, naturally processed and distinguished and known because of their sensory properties and associated with a certain local area, region, or country' (Almli et al. 2011). They are characterized by attributes that significantly affect the sustainability of their consumption, including the short expiration date, seasonality, special production conditions, storage and transportation of products, unevenness of the quantity and quality of the products throughout the year, and the lack of storage capacity (Tsoulakis et al. 2014). Consumers perceive TFP as products manufactured using sustainable production methods and recipes, which give them natural character and purity (Fernández-Ferrín et al. 2019). TFPs are consumed locally and nationally, creating healthier and more natural food habits. Their local characteristics reflect two sustainability components: the ecological component, which refers to the careful use of natural resources and care for the environment, as well as the component relating to economic and social care for producers and local people (Kalenjuk Pivarski

et al. 2022). Based on the literature reviewed above, the second hypothesis was developed.

H_2 : Interest in the attributes of the product linked to sustainability has a positive influence on the frequency of purchasing sustainable butter.

Sociodemographic environment of consumers. Some studies stress that different sociodemographic variables can explain consumer commitment to food purchases, measured by the premium the consumer is willing to pay or the frequency of purchase. Consumers differ in the importance they place on motives in their daily food choice (e.g. taste, health, price, production method, natural content, familiarity, and ethical concern) (Alles et al. 2017). There is some evidence that women rate most motives as more important than men, especially those related to health (Schliemann et al. 2019). Income is considered an indicator of an individual's ability to pay (Tapsoba et al. 2022) and some studies have shown a correlation between consumers' income and their consent to pay for food (Rihn et al. 2019). In general, sociodemographic variables explain marginally and not always in a consistent way consumers' choice of speciality food. Therefore, the following hypotheses were developed:

H_3 : A higher age of consumers has a positive influence on the frequency of purchasing sustainable butter.

H_4 : Female consumers are more likely to buy sustainable butter than male consumers.

H_5 : A smaller place of living has a positive influence on the frequency of purchasing sustainable butter.

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H_6 : A larger household of consumers has a positive influence on the frequency of purchasing sustainable butter.

H_7 : Income per person has a positive influence on the frequency of purchasing sustainable butter.

MATERIAL AND METHODS

Research instrument. We conducted a qualitative study through focus group interviews (FGI) with sustainable food consumers. The age of the respondents ranged from 24 to 60 years. The interview key was structured around the consumer's attitudes and behaviours. Open codes were generated to analyse the content of the responses manually, and emerging themes were used to formulate items to measure product knowledge and sustainability-related attributes. Based on qualitative research results and the literature review on consumer perceptions of sustainable food, the sets of elements focusing on the production process, product quality, price, retail location and trust in the product were constructed. The elements used to measure the proposed constructs were developed by FGI and by adapting prevalidated scales, where available. Several questions were adapted from Grayson and Martinec (2004) and Gilmore and Pine (2007) for product knowledge. Responses were measured with a five-point Likert scale. The demographic section included age cohorts, gender, size of place of residence, and income per person.

In this study, two different types of traditionally manufactured butter were used, one produced by a well-known brand (Masło Extra Łowickie) and the other by a less-known dairy (Osełka z Bychawy). A five-point Likert scale was given from totally disagree (1) to agree (5) for answering the options. In addition to these attitude questions, the questionnaire included sociodemographic questions. The questionnaire pilot was conducted using a sample of 20 respondents to identify and eliminate errors and misunderstandings in the questionnaire. This led to the modification of some statements to make them clearer for respondents.

The sample. To test the hypotheses, a professional market research agency was appointed to conduct online research on Polish consumers ($n = 825$) over the period from Jan 11, 2021, to Jan 22, 2021. A nonprobability sampling technique was applied in the online survey to a sample of Polish consumers. A total of 825 individuals answered the survey. The data was collected through a research agency. The screening criteria for

the recruitment of the respondents were: *i*) existing consumers of sustainable food products for at least six months; *ii*) primary household food shopper. Participants had to be over 18 years old to respond to this survey. They were recruited using a quota sampling technique, which allowed them to choose a sample with the same distribution of prespecified characteristics as in the whole population without overrepresentation. The gender and age quota restriction was introduced based on statistical data provided by the Polish Statistical Office (2019). The sample is generally representative of the Polish population in terms of gender and age (Table 1). This sample size provides a sampling error of less than $\pm 3\%$ with 95% confidence for dichotomous questions that are at the adequate level.

The respondents were asked to rate their attitudes and preferences towards traditionally manufactured butter. The two types of butter included in the survey were the Masło Extra Łowickie which is produced in Poland by the well-known brand Łowicz (Figure 2A)

Table 1. Sample structure ($n = 825$)

Variable	Category	Percentage
Age	less than 25	15.9
	26–35	19.8
	36–45	24.8
	46–55	17.7
	more than 56	21.8
Household size	1	9.5
	2	29.2
	3	49.9
	4	11.4
	5 and more	0
Gender	male	48.5
	female	51.5
Place (no. of inhabitants)	1 001–20 000	11.5
	20 001–100 000	29.7
	100 001–500 000	23.4
	500 001 and more	18.5
Income/person (EUR)	less than 265	9.5
	266–425	29.2
	426–640	49.9
	641 and more	11.4

Source: Own elaboration

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Figure 2. Chosen products Masło Extra Łowickie (A) and Osełka z Bychawy (B)

Source: Product websites

and a less well-known butter Osełka z Bychawy (Figure 2B) produced by OSM Bychawa. Both products have the quality mark Jakość Tradycja which guarantees their traditional character, safety, and standardized quality of the product.

RESULTS AND DISCUSSION

Descriptive statistics. First, the previous experience of the customers with the product was measured. In total, 75.64% of the respondents tried Masło Extra Łowickie before and only 17% tried the sustainable Osełka z Bychawy. These results show the great popularity of the butter produced by a large company. On average, respondents agreed that they prefer a product and perceive it as original if it is natural (73.36%), trustworthy (69.2%), has quality labels (65.5%), and the manufacturer of this product is committed to maintaining tradition (69.9%).

Masło Extra Łowickie seems to be recognized as a product manufactured under a well-known brand (mean = 4.47), trustworthy (mean = 4.10), natural (mean = 4.05), generally available on the market (mean = 4.29), with detailed packaging information (mean = 4.19). Compared to Masło Extra Łowickie, Osełka z Bychawy was perceived as an artisanal product (mean = 3.79), more expensive than standard ones (mean = 3.79) traditionally produced (mean = 3.85) and scarce on the market (mean = 3.35). Although most of the respondents perceive the products Masło Extra Łowickie and Osełka z Bychawy as traditional and original, to the extent that 78% of the respondents declare the purchase frequency of Masło Extra Łowickie, while Osełka z Bychawy 62% of the respondents.

Multinomial logistic regression. We applied multinomial logistic regression to determine the influence of selected independent variables and control covariables on the frequency of purchase, that is, a dichotomous variable suitable for multinomial logistic regression. Moderating variables may have significant

effects on the dependent variable, and sociodemographic variables are usually used as moderators in multinomial logistic regression models (Calegari et al. 2018). The model includes five moderating variables that represent sociodemographics: age, gender, place of residence, household size, and income per person (Table 2). For the multinomial logistic regression model, we have divided all variables into two categories to develop dichotomous variables. The variables in the multinomial logistic regression model were coded as follows: We considered the purchase frequency to be the dependent variable. Purchase frequency greater than 4, which means the purchase of butter once a week, was coded as 1 and less frequent purchase was coded as 0. The independent variables of product knowledge and sustainable production method are coded as 1 for a value greater than 3 (average agreement) and 0 for below average agreement. Finally, the moderating variables are age coded as 1 for respondents over 36 (because they have their own family with children and typically purchase more food products) and 0 for respondents under 36 (more frequently single living people). Gender represents 1 for women (because they

Table 2. Coded variables and their descriptions

Variable	Code	Description
Purchase frequency	0	≤ 4
	1	> 4
Product knowledge	0	≤ 3
	1	> 3
Product attributes linked to sustainability	0	≤ 3
	1	> 3
Age	0	< 35
	1	> 36
Gender	0	male
	1	female
Place (no. of inhabitants)	0	> 20 001
	1	< 20 000
Household size (no. of members)	0	≤ 2
	1	≥ 3
Income/person (EUR)	0	< 425
	1	> 426

Source: Own elaboration

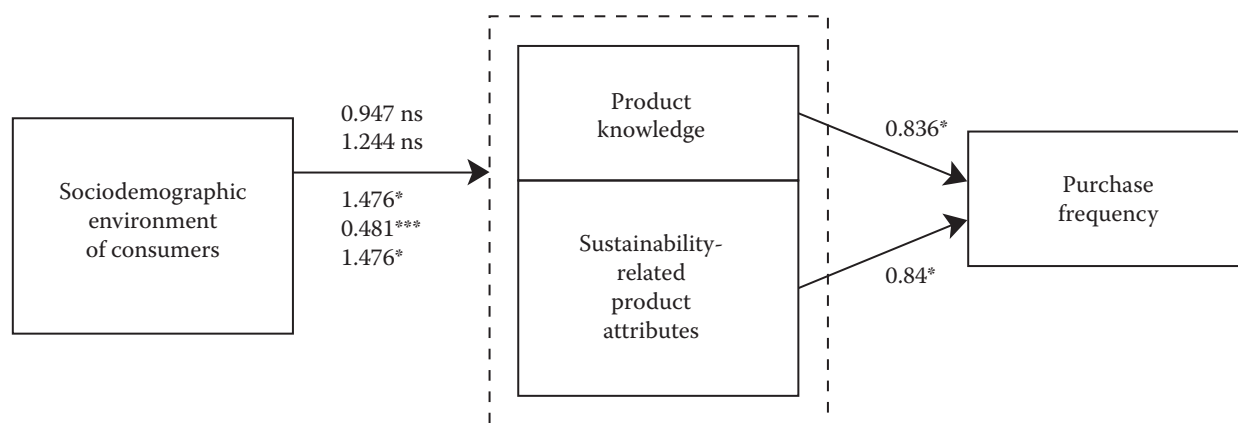


Figure 3. Results of hypothesis testing for Masło Extra Łowickie

*significant to 0.05 level, **significant to 0.01 level, ***significant to < 0.01 level; ns – not significant

Source: Own elaboration

are responsible for purchasing food products) and 0 for men. The place of residence with more than 20 000 inhabitants has a value of 1 because consumers living in larger cities are more interested in sustainable products with food quality label, a value of 0 for consumers living in places with less than 20 000 inhabitants. The household size is coded as 1 for households with three and more members (parents and at least one child), and 0 for smaller households. The income per person higher than EUR 426 per person is coded as 1 (the higher is income, the more can be spent on sustainable products) and 0 for income per person lower than EUR 425.

The model used in this study uses the findings presented by Asioli et al. (2016) and Calegari et al. (2018). In the model, the primary variables (product attributes) interact with the moderating variables that represent the demographics of the consumer. The multinomial logistic

regression model was calculated by the statistical software SPSS. The ROC (receiver operating characteristic) analysis shows that the model (P -value < 0.001) has the required predictive capacity. Table 3 presents the estimated parameters of the logistic model for the main effects and their interactions with the moderating variables for the two products separately (Masło Extra Łowickie and Osełka z Bychawy). Based on the Wald statistics, it is possible to assess which of the research attributes are significant (P -value < 0.05) for the frequency of purchase.

For interactions between independent variables, only the interaction between product knowledge and sustainability-related product attributes of Osełka z Bychawy is significant (P -value < 0.05). Interactions between moderating variables were not significant (P -value < 0.05) as presented in Table 3. The results of the hypotheses tests are shown in Figures 3 and 4.

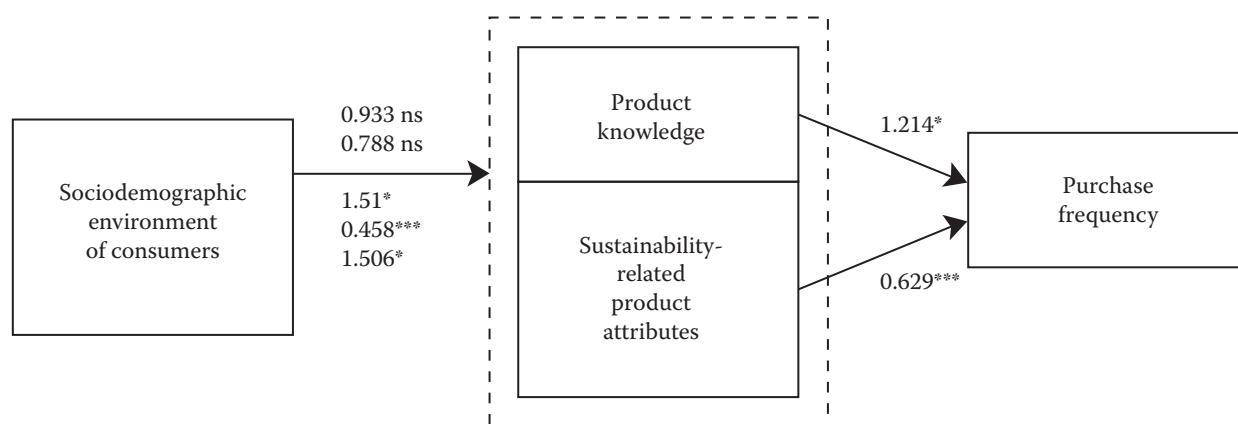


Figure 4. Results of hypothesis testing for Osełka z Bychawy

*significant to 0.05 level, **significant to 0.01 level, ***significant to < 0.01 level; ns – not significant

Source: Own elaboration

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Table 3. Model parameters and their significance for Maslo Extra Lowickie and Oselka z Bychawy

Research items	Maslo Extra Lowickie				Oselka z Bychawy					
	β	SE	Wald	Sig.	Exp(β)	β	SE	Wald	Sig.	Exp(β)
Main interactions										
Product knowledge	-0.179	0.091	3.875	0.049*	0.836	0.194	0.095	4.177	0.041*	1.214
Sustainability-related product attributes	-0.174	0.086	4.40	0.044*	0.840	-0.464	0.099	21.983	0***	0.629
Age	-0.055	0.202	0.074	0.786	0.947	-0.017	0.204	0.007	0.933	0.983
Gender	0.218	0.195	1.252	0.263	1.244	0.053	0.198	0.073	0.788	1.055
Place	0.389	0.199	1.252	0.05*	1.476	0.412	0.202	4.16	0.041*	1.510
Household size	-0.733	0.191	14.663	0***	0.481	-0.781	0.193	16.373	0***	0.458
Income per person	0.389	0.204	3.636	0.05*	1.476	0.409	0.206	3.946	0.047*	1.506
Product knowledge \times Product attributes linked to sustainability	-0.127	0.107	1.408	0.235	0.881	-0.184	0.082	5.004	0.025*	0.832
Interactions with sociodemographic variables										
Product knowledge \times Age	-0.116	0.198	0.341	0.559	0.891	0.091	0.202	0.202	0.653	1.095
Product knowledge \times Gender	0.08	0.197	0.165	0.685	1.083	0.03	0.208	0.021	0.886	1.030
Product knowledge \times Place	0.019	0.203	0.009	0.926	1.019	-0.164	0.21	0.605	0.437	0.849
Product knowledge \times Household size	0.081	0.195	0.17	0.68	1.084	-0.115	0.203	0.32	0.572	0.892
Product knowledge \times Income per person	0.163	0.21	0.6	0.439	1.177	-0.136	0.211	0.417	0.518	0.873
Sustainability-related product attributes \times Age	0.028	0.183	0.023	0.878	1.028	-0.107	0.224	0.228	0.633	0.898
Sustainability-related product attributes \times Gender	-0.001	0.178	0	0.997	0.999	-0.222	0.213	1.086	0.297	0.801
Sustainability-related product attributes \times Place	0.048	0.183	0.068	0.794	1.049	0.194	0.211	0.847	0.357	1.214
Sustainability-related product attributes \times Household size	-0.086	0.177	0.238	0.626	0.917	0.172	0.212	0.655	0.418	1.187
Sustainability-related product attributes \times Income per person	0.065	0.193	0.114	0.736	1.067	0.353	0.233	2.295	0.13	1.423

*significant to 0.05 level; **significant to 0.01 level; ***significant to less than 0.01 level; β – odds ratio; Wald – Wald statistics; Sig. – significance level; Exp. – exponential
Source: Own elaboration

Discussion. Product knowledge is influenced by past purchases (Nguyen et al. 2015) and positively influences purchase frequency in the present. The low frequency of purchasing sustainable food may be related to the relative inadequacy of the available information. For some consumers, a lack of information about food products can be a barrier to increased purchasing. Some studies highlight the importance of marketing communication aimed at popularising sustainable food among target consumer groups (Barska and Wojciechowska-Solis 2018). In this study, we suggest that product knowledge and sustainability-related attributes do not positively influence the purchase frequency of sustainable butter. Furthermore, we found differences in consumer preferences depending on product type and consumer income, place of residence, and household size. The interactions between product knowledge and product attributes linked to sustainability and moderating sociodemographic variables (age, gender, place, household size, and income per person) were statistically significant only for the size of the place of living, the household size, and the income per person. The moderating variables themselves state a positive influence on the frequency of purchase. Furthermore, there was a positive relationship between income per person and the frequency of purchases, because, with increasing income, consumers purchase more sustainably produced butter. Surprisingly, we found no statistically significant relationship between gender and the purchase frequency, so we cannot estimate that women purchase sustainably produced butter more often than men.

This research also provides a novel application of the SOR framework on sustainably produced butter as a specific type of food product. The application of the SOR model in this study allowed insight into the processes that occur in the organism of the SOR model and described the process leading to the consumer's final purchase decision. In the case of sustainable food purchasing behaviour, we focus on how stimuli, namely the socio-demographic environment of consumers, influence activation and cognitive processes in the organism and result in a sustainable butter choice.

CONCLUSION

This paper makes several contributions to the literature on butter and sustainable foods. The literature on non-sensory attributes of butter was enriched by examining the role of product attributes associated with sustainability and product knowledge in shaping

consumer pre-purchase perception. This context has been studied for the first time for the butter to understand if it is part of consumers' pre-purchase preferences. The results showed that product knowledge and sustainability-related product attributes do not always play an important role in shaping food consumer preferences. Therefore, we assume that these aspects are not as relevant for butter as was expected. It can be expected that the brand itself and the food quality labels could play a more important role for consumers without previous experience.

The findings of this analysis can support policymakers and producers by providing information on the significance of certain characteristics of butter, especially from the socio-demographic perspective of respondents. Sustainable food is linked to the use of sustainable ingredients and production processes, leading to adequate product quality and sensory attributes, however, these factors are not always associated with consumers, and this is where communication strategies should be enhanced.

There are some limitations to this study. The first limitation of this study is the narrow focus only on two food products, and two brands of butter. The differences between product groups could be significant and further research should also focus on other sustainable food products such as other milk products and meat products, which could show interesting findings. Additional product categories should be included in order to generalise these findings or to find assumptions under which product knowledge and sustainability-related attributes better influence purchase frequency. Second, in the online survey, the respondents were exposed to images of the two products to discern their preferences without the opportunity of trying them out. Adding the possibility of sensory evaluation of the products could contribute to a better result. Furthermore, this research was focused only on one central European country, Poland, but the results in other European countries can be different due to the various interests in sustainable food products in particular countries. A strong positive orientation towards sustainable food products is typical for Mediterranean countries (such as France, Italy, and Spain) and rather weaker for Central and Eastern European countries (Sadílek 2019). Therefore, future studies could focus on investigating the consumer preferences for sustainable food products employing experimental design, i.e. manipulating prices and product attributes, and including branded and blind sensory tests.

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