RESEARCHING ASPECTS OF SUSTAINABLE FOOD CONSUMPTION IN SLOVAKIA

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The main goal of the article is to understand the motives related to sustainable development that guide consumers when choosing food. For this understanding, we will use a comprehensive and proven method for measuring sustainability motives – the Sustainable Food Choice Questionnaire (SUS-FCQ). The investigation of the areas of motives for sustainable food selection will be carried out through a multidimensional classification of factors. The effort is to identify factors into clusters and create characteristic groups of respondents preferring or not preferring sustainable food and to reveal their reasons for choosing.

Keywords: sustainable food consumption, sustainability, food selection motives, regionality, seasonality

Introduction

Achieving a healthy and sustainable food future is an urgent matter that depends mainly on the attitude towards sustainability of all countries of the world. It is necessary to adopt such procedures that fulfill the needs of society to a sufficient extent and at the same time protect the environment (Harvard T.H. Chan, 2024). A number of food consumption concerns are currently at the top of political agendas around the world, clearly illustrating how far-reaching the issue is. In his keynote speech at the UN Food Systems Summit, UN Secretary-General António Gueterres noted: "More than 100 countries have submitted voluntary progress reports on food systems transformation. Countries are taking decisive steps to reflect this priority in national and regional laws, policies, and programs." (United Nations, 2024)

As policy programs aim to promote healthy eating habits, there is a growing need for more accurate predictions of such interventions. A deeper understanding of the factors that influence individuals' food choices requires consideration of not only their diet, but also cultural and social contexts, psychological influences, and biological processes (Leng, 2016). Dividing food choice factors solely on the basis of sociodemographic variables is not enough (Benda Prokeinova, 2021). Personality characteristics, lifestyle, and behavior are also essential to consider (Verain, 2012).

60 intervention studies (Shangguan et al., 2019) reveal that food labeling is an effective means of reducing total energy and fat intake while promoting higher vegetable consumption. In addition, the perception of industrially added sodium and artificial trans fatty acids in products has a positive impact. In a study conducted by the author Asif (2018), it was found that environmental concern is among the insignificant factors in relation to the purchase of organic food. An individual's egoistic motive, such as the fact that organic food greatly supports one's health, tends to be a much more influential factor in purchasing food. It has also been shown to be a highly valued subjective perception of organic food, which implies the increasing importance of the general perception of these foods among consumers.

The idea of eating insects as a substitute for meat turns out to be only a theoretical assumption and the reality of actually eating insects is quite different. Consumers who have declared their agreement with this alternative to meat may not necessarily be willing to buy insects for their own consumption. Consistent with the study's findings, the highest likelihood of consuming insect-based foods was seen in those with low levels of food neophobia and low disgust sensitivity. In addition, men are more familiar with the concept of entomophagy, the consumption of insects as food, and are more willing to accept the idea of insects as meat substitutes. It has also been shown that educating people about the sustainable properties of insect-based foods and focusing marketing strategies on this property is not enough to convince consumers to buy and eat insects (Modlinska, 2021).

The three most identified consumer segments with regard to sustainable food consumption are: "green", "potentially green", and "non-green". These segments differed from each other at all three levels of abstraction, and each offered a different level of sustainable food consumption (Verain, 2012). The author Kushwah (2019) also points to the significant connection between social and emotional value in relation to the ethical consumption of sustainable food. The author Azzurra (2019) concluded that the European Union has introduced relatively strict regulation of the organic sector (to support environmental sustainability, biodiversity, and animal welfare), thereby stimulating the growth of organic consumption as a sustainable model. To further increase sustainable consumption, policy makers and industry experts need more information on the determinants that influence consumer behavior in order to design solutions to move society towards sustainability in food choices. Especially considering the complexity and multidimensionality of the determinants governing the choice of organic food, it seems useful to design composite indices capable of providing an overview of these determinants and their relationships.

In another study conducted in Finland, the author Wahlen (2011) identified three main reasons that lead to increased sustainable food consumption:

1. proper creation of policies,
2. improved catering in canteens and restaurants,
3. final choice of sustainable food by consumers.

In addition, he suggests improving the visibility of sustainable food. In particular, sustainable school meals in classes should be strengthened so that children learn to eat tasty and healthy vegetarian meals. It also contrasts the "ideological" elements of the vegetarian school lunch debate with the more moderate kind of promotion of vegetable-based foods on both health and environmental grounds. In this context, he emphasizes the importance of making vegetable-based foods more attractive: "Vegetarian

foods should be attractive and delicious to change negative attitudes and overcome skepticism." However, another study conducted in Norway says that despite increased political commitment to increase the consumption of sustainable foods over a period of 15 years, only a marginal increase in their consumption has been achieved (Vittersø, 2015). The reasons must be found in the determinants of consumer preference, which our work also offers. The author Feil (2020) also states that although organic food consumption is increasing worldwide, the driving forces, especially in peripheral regions, of how sustainable food production and consumption systems are developing are still not fully understood. Inconsistencies are mainly found in how people perceive organic food, what motivates people to buy it, and their attitude behavior when buying organic food.

The primary goal of the contribution is to understand the sustainability motives that consumers have when choosing food. For this understanding, we will use a comprehensive and proven method for measuring sustainability motives – the Sustainable Food Choice Questionnaire (SUS-FCQ). The investigation of the areas of motives for sustainable food selection will be carried out through a multidimensional classification of factors. The effort is to identify factors into clusters and create characteristic groups of respondents preferring or not preferring sustainable food and to reveal their reasons for choosing.

Material and methods

To investigate the motives of sustainable food consumption, a questionnaire survey was created. The questionnaire survey was carried out during the winter period of 2023. The questions were formulated based on the solved issue. For this reason, we used the standardized SUS-FCQ questionnaire (Verain et al., 2021), which we modified and translated into Slovak. A total of 374 responses were recorded.

142 responses, i.e. 38.38%, were records from men. The number of responses from women was 86 more, namely 228, i.e. 61.62%. As many as 164 records, 44.32%, represented people aged 18 to 24 years. Next came the category of people aged 40–49, with a share of 18.11%. Between the ages of 30 and 39, 13.24% of all respondents answered. The number of people in the age category 25–29 was 5.95%. There were only 12 people under the age of 18, i.e. 3.24% – these respondents, because of their young age, were subsequently removed from several statistical analyses. The rest, i.e. people over 50 years of age, made up 56 instances, i.e. 15.14%. We can see that the largest share of households, 120, had an income in the range of €1,700 – €2,499 with a percentage of 32.43%. The second largest group with a share of 25.95% (96) households had an income of €2,500–3,499. This was followed by a group of households, 20.00% (74), with an income of €800–1,699. 28 households, i.e. 7.57%, had an income of €3,500–€4,999. 24 respondents had more than €5,000 per month, i.e. 6.49%. Only 16 respondents, i.e. 4.32%, have a monthly household income of less than €799, and 12 people (3.24%) refused to state this figure.

The respondents were asked to record their highest level of education. Most 131 people, 35.41%, stated a bachelor's degree. 116 respondents, or 31.35%, achieved the second level of higher education – master's or engineering. Another 92 people, i.e. 24.86%, fall into the category of secondary education. 23 people, i.e. 6.22%, achieved a doctorate or even higher education. Only 8 people, 2.16%, stated primary education.

The Chi-square goodness-of-fit test was used to test the representativeness of the data. Since the representativeness of the sample set was not proven in all socio-demographic indicators, non-parametric statistical tests were used for further calculations.

Table 1 Characteristics of respondents

Sex	female	228	61.62%
	male	142	38.38%
Age	17 and less	12	3.24%
	18–24	164	44.32%
	25–29	22	5.95%
	30–39	49	13.24%
	40–49	67	18.11%
	50–59	26	7.03%
	60 and more	30	8.11%
Education	bachelor	131	35.41%
	master	116	31.35%
	secondary	92	24.86%
	PhD	23	6.22%
	primary	8	2.16%
Income	2,500–3,499 €	96	25.95%
	till 799 €	16	4.32%
	800–1,699 €	74	20.00%
	1,700–2,499 €	120	32.43%
	3,500–4,999 €	28	7.57%
	more than 5,000 €	24	6.49%
	I dont want say	12	3.24%
Responsible	no	128	34.59%
	yes	242	65.41%

Source: own research

In the contribution, several methods and procedures are used, which make it possible to investigate the reasons for choosing sustainable foods. This is a descriptive statistical analysis. The method of multivariate statistical classification – cluster analysis – is applied. Analyses were processed using professional statistical software such as SAS OnDemand for Academics, SAS Enterprise Guide 7.1 and MS Excel. Graphic processing was carried out using software (dendrograms).

To investigate the motives and subsequent segmentation of the factors that influence the choice and consumption of sustainable foods, a cluster analysis was used. Cluster analysis is used in solving problems of typology of objects and their classification. Its goal is to decompose a group of objects into clusters so that objects that belong to the same cluster are as similar as possible (close) and objects that belong to different clusters are as different as possible (least similar). Our analysis uses a hierarchical clustering method – Ward's method, which is because clusters are formed by minimizing their heterogeneity (Benda Prokeinová, 2014). The interpretation of individual created clusters is realized through a dendrogram. The definition of Ward's clustering method according to the author Großwend et al. (2019) has the form:

$$D(A, B) = \Delta(A \cup B) - \Delta(A) - \Delta(B)$$

where: $\Delta(A \cup B)$ – the sum of the squared distances of individual points from the centroid of the cluster after merging clusters A and B; $\Delta(A)$ – the sum of squares for cluster A; $\Delta(B)$ – the sum of squares for cluster B

The formula tells us how the squared distances between the centroids of the clusters will change after the merger compared to their original values before the merger.

The Mann-Whitney test was used for statistical calculations to examine the existence of differences between 2 groups, as the obtained data are non-parametric. Approximate p-values for normal distribution were also applied, since the number of respondents was more than 360. The test was performed to compare rational, irrational respondents and responsible, irresponsible respondents for household food purchases. The test is performed using the following calculation (Rosner, 1999):

$$Z_c = \frac{W_c - \mu_c}{\sigma_c}$$

where: W_c and μ_c – the expected observations of the Mann-Whitney test;
           σ_c – the standard deviation of W_c

Results and discussion

By researching the following area, we are trying to identify the determinants of sustainable and healthy food consumption. The results give us an insight into how consumers perceive sustainable food behaviour and to what extent they practice sustainable behaviour. Eating seasonal/local foods and, to a lesser extent, free range products are the most popular strategies. In terms of willingness to change the amount of meat consumption, other animal products (e.g. cheese, eggs, and fish) are the most popular alternatives. New products such as "hybrid" meat or insects are not yet met with great enthusiasm (Bouwman, 2016).

Respondents were asked in our questionnaire how often they consume selected foods or food components during the week. In the following graph, we observe the frequency of consumption of selected foods. Among the most interesting results is the consumption of hybrid meat, as up to 72.16%, i.e. 267 people, indicated that they do not consume such food at all. When
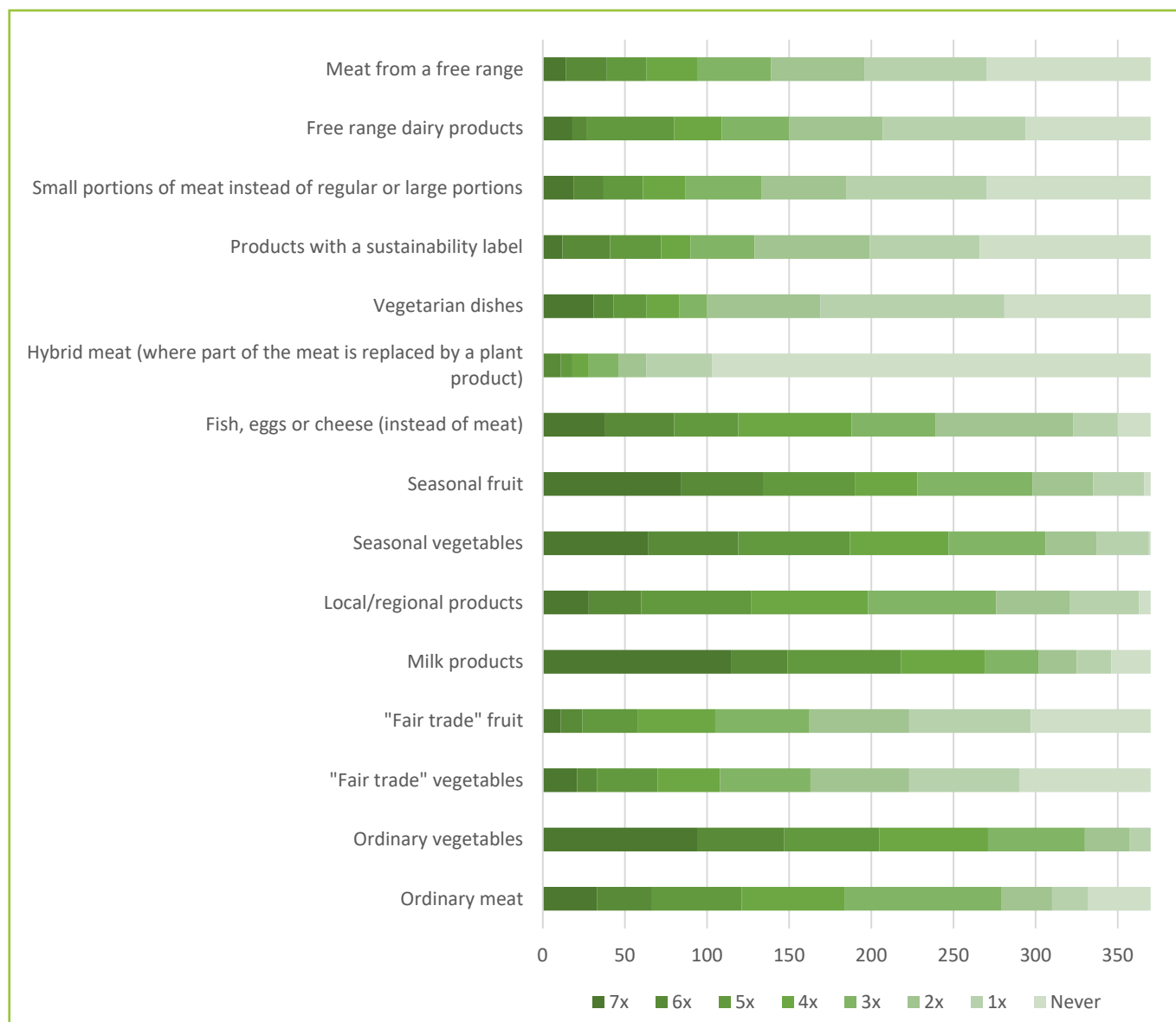

Figure 1   Sustainable food consumption preferences
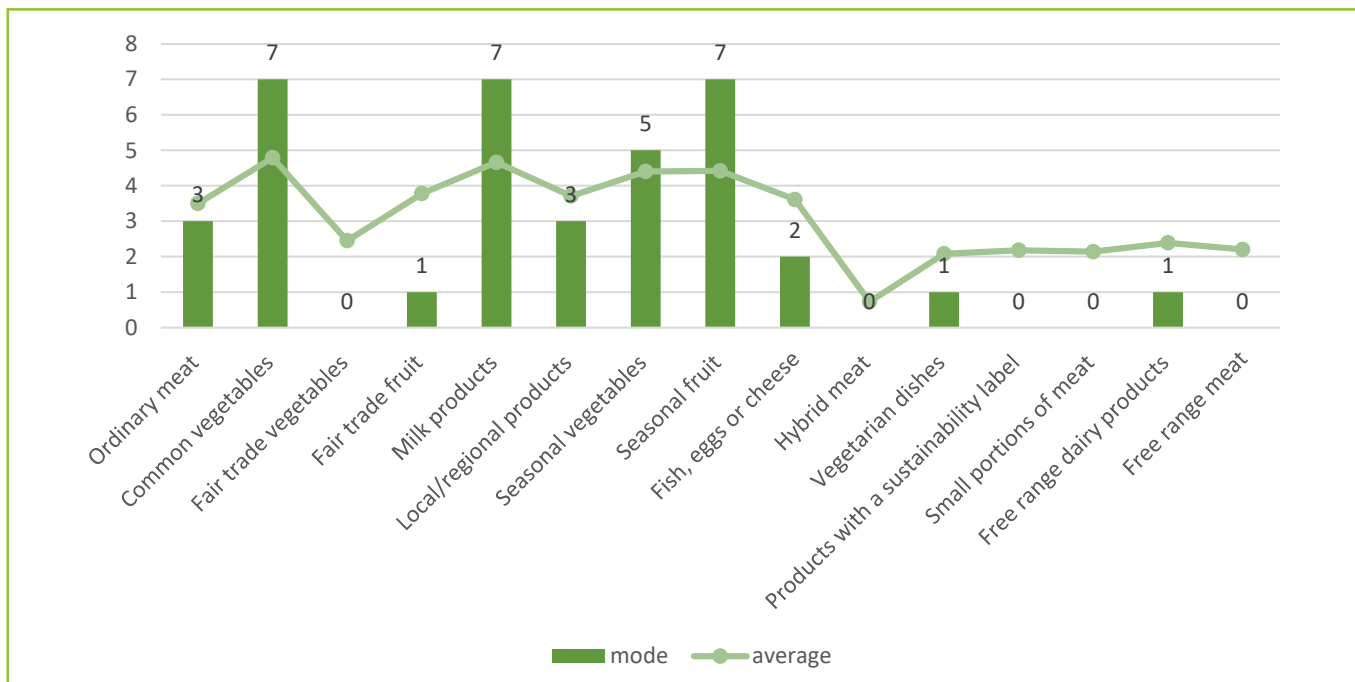Source: Own research

Figure 2 Comparison of statistical indicators: mean and mode. Food consumption
Source: own research

comparing the alternatives: free-range meat and regular meat, we can see higher preferences. Consumers mostly indicated the consumption of ordinary meat. Specifically, up to 121 people (32.70%) consume ordinary meat at least 5 times a week, while only 17.03%, i.e. 63 people,

consume free-range meat at least 5 times a week. Also, a combination of fish, eggs or cheese seems to be a more suitable substitute for meat, as people answered evenly in this category and up to 50.81% of people eat this combination at least 4 times a week.

The graphical output of the mode and mean statistical characteristics for a given area of sustainable food consumption is shown in Figure 2.

The variables that have a mode value of 7 and thus the most consumption per week include: consumption of ordinary vegetables, dairy products, and seasonal fruits. On the other hand, the foods that reached a mode with a value of 0 include: consumption of Fairtrade vegetables, hybrid meat, products with a sustainability label, smaller portions of meat, and free-range meat. For these areas, we assume the smallest consumption within a week.

To identify the determinants of sustainable and healthy food consumption, we decided to apply cluster analysis for clustering, we applied Ward's method, as it proved to be the best variant. The number of clusters was identified based on the semi-partial coefficient of determination that indicated the largest shift when merging two clusters into one. That's why we further thought about creating exactly 2 clusters. We also achieved confirmation of this conclusion by using a dendrogram, which graphically illustrates this shift.

The first cluster can be characterized as premium sustainable foods. Consumers indicated that they do not prefer food that is marked with the sustainability mark (Fairtrade), hybrid meat, or free-range products. We also noticed that there
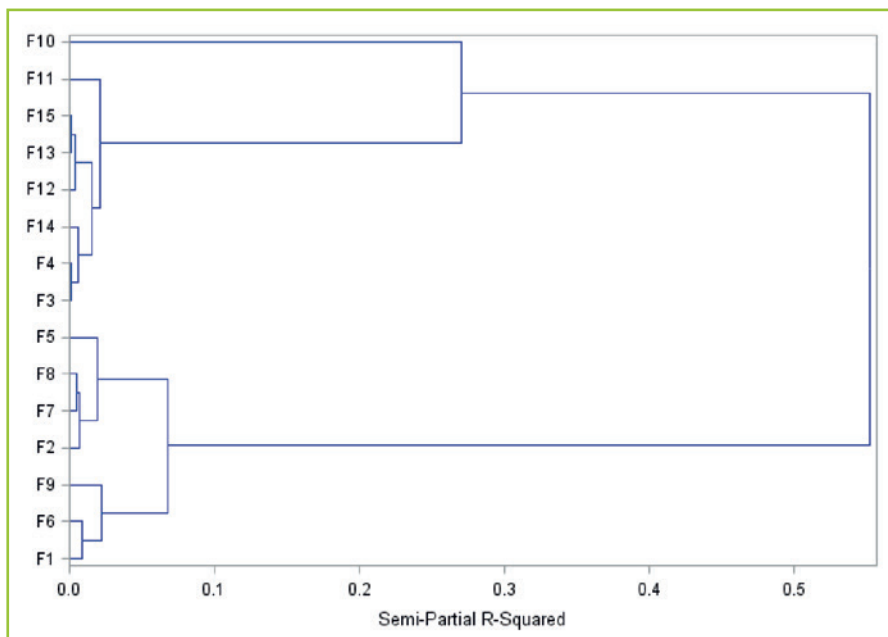

Figure 3 Cluster analysis of preferred food consumption
Source: Own research
consumption of selected foods: F1 – regular meat; F2 – regular vegetables; F3 – "fair trade" vegetables; F4 – "fair trade" fruit; F5 – dairy products; F6 – regional products; F7 – seasonal vegetables; F8 – seasonal fruit; F9 – fish; eggs or cheese instead of meat; F10 – hybrid meat where part of the meat is replaced by a plant product; F11 – vegetarian dishes; F12 – products with a sustainability label; F13 – small portions of meat instead of regular or large portions; F14 – free range dairy products; F15 – free range meat

Table 2   Cluster 1 of preferred food consumption. Premium sustainable food

Consumption within a week/factor	0x	1x	2x	3x	4x	5x	6x	7x
F3	80	67	60	55	38	37	12	21
F4	73	74	61	57	47	34	13	11
F10	267	40	17	18	10	7	11	0
F11	89	112	69	17	20	20	12	31
F12	104	67	70	39	18	31	29	12
F13	100	85	52	46	26	24	18	19
F14	76	87	57	41	29	53	9	18
F15	100	74	57	45	31	24	25	14

Source: own research

consumption of selected foods: F3 – "fair trade" vegetables; F4 – "fair trade" fruit; F10 – hybrid meat where part of the meat is replaced by a vegetable product; F11 – vegetarian meals; F12 – products with a sustainability label; F13 – small portions of meat instead of regular or large portions; F14 – free range dairy products; F15 – free range meat

Table 3   Cluster 2 of preferred food consumption. Commonly available, local and seasonal foods

Consumption within a week/factor	0x	1x	2x	3x	4x	5x	6x	7x
F1	38	22	31	95	63	55	33	33
F2	0	13	27	59	66	58	53	94
F5	24	21	23	33	51	69	34	115
F6	7	42	45	78	71	67	32	28
F7	1	32	31	59	60	68	55	64
F8	4	31	37	70	38	56	50	84
F9	20	27	84	51	69	39	42	38

Source: Own research

consumption of selected foods: F1 – commonly available meat; F2 – commonly available vegetables; F5 – dairy products; F6 – regional products; F7 – seasonal vegetables; F8 – seasonal fruits; F9 – fish; eggs; or cheese instead of meat

is no preferred interest in vegetarian dishes, or a reduced proportion of meat in meals.

We identify the second cluster as commonly available, local, and seasonal foods. People indicated that they much prefer to consume commonly available meat, vegetables, and dairy products. However, replacing meat with fish, eggs or cheese seems to be a sustainable version of food. On the other hand, there was an increased demand for regional and seasonal products, which also represents a form of more sustainable behavior.

In conclusion, we can conclude that people prefer factors from cluster 2 – commonly available, local, and seasonal foods to a higher degree than cluster 1, characterized as premium sustainable foods.

Conclusion

Motives for food consumption in Slovakia differ in many aspects from findings in other countries. In Slovakia, healthy food and affordability influence consumers more than the sustainability of food itself. This indicates that interest in sustainability may be less pronounced in Slovakia compared to some other countries. Respondents in Slovakia showed an increased demand for locally and seasonally produced food, while showing less interest in sustainability. This trend may be different from countries where more emphasis is placed on sustainable and ecological aspects. Slovak respondents showed a low preference for premium sustainable foods. We can consider food marked with the sustainability label or hybrid meat as premium foods. On the contrary, it is preferred to eat commonly available meat, vegetables, and local foods. In Slovakia, this difference can be caused by cultural or economic factors. A comparison of the results between Slovakia and other countries offers an interesting picture of how preferences and behaviour differ (Bouwman, 2016): Respondents in the Netherlands frequently mentioned air and water pollution as aspects of sustainable food and considered them important. In contrast to Slovakia, the general emphasis on seasonal and local food is the lowest in the Netherlands. Nevertheless, the Dutch score high in objective knowledge about sustainable food. Danish consumers show a high interest in organic food and animal welfare as aspects of sustainable food. They score high in objective knowledge about and positive attitude towards sustainable food. They perform less sustainable behavior and are less open to new products, which is similar to the findings in Slovakia. In the Czech Republic, there is an increased interest in healthy food and land use as an aspect of sustainability. Compared to other countries, Czech respondents were the least open to alternatives to meat, such as vegetarian food. Similar results were also found in Slovakia, where the vast majority of respondents refuse to replace meat with other alternatives. French respondents often mentioned local and regional food and transport distance as important aspects of sustainable food, achieving similar results to Slovakia. At the same time, they had a relatively high intake of free-range or sustainability-labeled products. Italian consumers show a high interest in food safety and score high on many sustainable behaviors. They have a significantly positive attitude towards plant-based alternatives and are the most involved in sustainable behaviour. Our results show the opposite attitude to that of Italy and the fact that Slovaks do not support plant-based alternatives to a significant degree and prefer to consume ordinary meat and vegetables, with little regard for sustainability.

References

Asif, M. – Xuhui, W – Nasiri, A. et al. 2018. Determinant factors influencing organic food purchase intention and the moderating role of awareness: A comparative analysis. In Food Quality and Preference, vol. 63, 2018. https://doi.org/10.1016/j.foodqual.2017.08.006

Benda-Prokeinová, R. 2014. Štatistika v SAS-e, SAS v štatistike. Nitra : ASPA. ISBN 978-80-972772-6-0

Benda Prokeinová, R. – Hanová, M. – Turčeková, N. 2021. Sensitivity analysis of price indices in models of demand systems. In Statistika, vol. 101, 2021, no. 3, pp. 268–282. ISSN 0322-788X

Harvard T. H. Chan. 2024. School of Public Health. Sustainability. [online]. [cit. 2024-02-04]. Dostupné na: https://www.hsph.harvard.edu/nutritionsource/sustainability/

Kushwah, S. et al. 2019. Ethical consumption intentions and choice behavior towards organic food. Moderation role of buying and environmental concerns. In Journal of Cleaner Production, vol. 236, 2019. ISSN 0959-6526. https://doi.org/10.1016/j.jclepro.2019.06.350

Modlinska, K. – Aadamczyk, D – Maison, D. et al. 2021. Relationship between Acceptance of Insects as an Alternative to Meat and Willingness to Consume Insect-Based Food – A Study on a Representative Sample of the Polish Population. In Foods, vol. 10, 2021. https://doi.org/10.3390/foods10102420

Rosner, B. – Grove, D. 1999. Use of the Mann–Whitney U-test for clustered data. In Statistics in Medicine, vol. 18, 1999, no. 11. https://doi.org/10.1002/(SICI)1097-0258(19990615)18:11%3C1387::AID-SIM126%3E3.0.CO;2-V

Shangguan, S. – Afshin, A. – Shulkin, M. et al. 2019. A Meta-Analysis of Food Labeling Effects on Consumer Diet Behaviors and Industry Practices. In American Journal of Preventive Medicine, vol. 56, 2019. ISSN 0749-3797. https://doi.org/10.1016/j.amepre.2018.09.024

United Nations Organisation. 2023. Fast Facts – What are sustainable food systems? [online]. [cit. 2024-02-04]. https://www.un.org/sustainabledevelopment/fast-facts-what-are-sustainable-food-systems/

Verain, M.C.D. – Bartels, J. – Dagevos, H. et al. 2012. Segments of sustainable food consumers: a literature review. In International Journal of Consumer Studies, vol. 36, 2012, no 2. ISSN 1470-6431. https://doi.org/10.1111/j.1470-6431.2011.01082.x

Verain, M.C.D. – Snoek, H.M. – Onwezen, M.C. et al. 2021. Sustainable food choice motives: The development and cross-country validation of the Sustainable Food Choice Questionnaire (SUS-FCQ). In Food Quality and Preference, vol. 93. ISSN 0950-3293. https://doi.org/10.1016/j.foodqual.2021.104267

Wahlen, S. – Heiskanen, E. – Aalto, K. 2012. Endorsing Sustainable Food Consumption: Prospects from Public Catering. In J Consum Policy, 2012, no. 35, pp. 7–2. https://doi.org/10.1007/s10603-011-9183-4

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