
CONSUMER TRENDS IN BAKERY MARKET: UNDERSTANDING OF CONSUMER PERSPECTIVES AND PREFERENCES FOR FUNCTIONAL BAKERY PRODUCTS IN SLOVAKIA

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ABSTRACT

The aim of the paper is to identify key consumer attitudes towards functional bakery products and explore factors affecting consumer behavior. The study is based on questionnaire survey conducted on a sample of 775 functional bakery products consumers in Slovakia. The results showed that consumers prefer grain and whole wheat bread, while sweet pastries with low-calorie sweeteners are the least consumed. Furthermore, key factors influencing purchase are freshness, quality, taste, and health benefits. The results indicated that consumers are choosing products based on increased whole grain content, fiber, and minerals and key reasons for consumption are reducing obesity risk and supporting digestive health. The study also pointed out consumer awareness and interest in healthy eating as key drivers for future market development. Findings provide valuable information to food companies in the new bakery products development and marketing, as well as to policy makers in supporting the public health.

Introduction

Bakery products play an important role in human nutrition and are the basis of any daily diet. Their social importance is linked to cultural traditions, availability and diverse assortment (Mickiewicz, Britchenko, 2022). The global bread and bakery market

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has evolved significantly over the past decade, driven by changing dietary patterns, increased competition from small-capacity bakeries and retail chains, the adoption of digital technologies, the COVID-19 pandemic, as well as broader economic and political developments (Kostyuchenko et al., 2024). In this context, functional bakery products have emerged to meet these new market trends and are defined as products that offer health benefits beyond their basic nutritional value, through the inclusion of functional ingredients or the optimization of their nutritional composition (Guiné, Florença, 2024; Karantonis et al., 2022). The increased demand for such products prompts companies to diversify and innovate, creating opportunities for market expansion and exports (Królak et al., 2022). It follows from the above that the current trend is the expansion of functional bakery products to meet the nutritional needs of consumers as well as the requirements for an active lifestyle and sustainable consumption (Kostyuchenko et al., 2024; Mickiewicz, Britchenko, 2022; Maiboroda, 2021).

Functional bakery products play an essential role in today's food context, particularly due to the increasing incidence of chronic diseases associated with unhealthy eating and modern lifestyles (Dossa, Rivis, 2024; Martirosyan et al., 2021). Given that bakery products are staple foods and are consumed frequently and in large quantities by the majority of the global population (Mickiewicz, Britchenko, 2022; Di Cairano et al., 2022), fortifying them with functional ingredients is an effective and affordable way to increase their nutritional value, reduce the risk of disease and support long-term health (Zupo et al., 2026; Guiné, Florença, 2024; Karantonis et al., 2022). The functionality of sweet or savory bakery products can result from their intrinsic properties or from the incorporation of beneficial ingredients such as fiber, protein and bioactive molecules (Di Cairano et al., 2022). The literature highlights a significant diversity of studies on functional bakery products, focusing either on sensory attributes or on health claims (Guiné, Florença, 2024; Pinto et al., 2014). However, there are few studies that analyze the purchasing and consumption behavior of functional bakery products (Han, Kim, 2015; Hwang et al., 2006), with most research focusing on conventional bakery products (Chatziharalambous, Koutelidakis, 2025; Choudhary et al., 2021). Current marketing strategies in the bakery sector are based on innovation and the use of technologies that enable the development of new products to meet several criteria simultaneously: they must be tasty, healthy and affordable (Guiné, Florença, 2024; Zarzycki et al., 2024). Improving the chemical composition of bakery products often involves replacing traditional ingredients with healthier ones and this is a challenge for manufacturers, who need to maintain product quality and stability in the long term, as well as consumer acceptance, due to possible changes in sensory characteristics (Zarzycki et al., 2024; Sajdakowska et al., 2020). Cristea et al. (2025) highlight that the success of marketing strategies depends on the integration of elements specific to sustainable development and the customization of functional bakery products (Zhang et al., 2022).

Consumer preferences regarding functional bakery products are influenced by numerous factors: cognitive, sensory, value-based and contextual. Nicolosi et al. (2023) highlight that buyers' choices are increasingly conscious, being determined both by taste pleasure

and, above all, by the level of knowledge about the benefits of the products. The information on the label can play a decisive role in the choice and consumption of these products, especially among health-conscious consumers and athletes (Sajdakowska et al., 2020). Increased consumer awareness of labels and ingredients is driving a preference for functional bakery products with “clean labels,” which are natural and free of synthetic additives (Polachini et al., 2023). Chatziharalambous and Koutelidakis (2025) recommend that stakeholders grant tax breaks to manufacturers of functional bakery products and take measures to ensure the correct labeling of these products, while also organizing public health campaigns to educate consumers on how to read and understand the information provided on labels. Freshness and minimal processing are among the most important attributes for consumers, as they are associated with safety and health benefits (Miolla et al., 2023).

According to Guiné and Florença (2024), awareness of the importance of healthy eating and the search for more nutritious food alternatives are determining factors in the choice and consumption of these products. Health-related motivations are also highlighted in the study by Sajdakowska et al. (2020), which analyses consumer behavior in the case of bread enriched with functional ingredients. Thus, the perception that fiber bread is more nutritious and helps prevent health problems significantly influences the consumption of this type of functional bakery product. However, functional benefits are not sufficient for product acceptance if the sensory experience, especially taste, does not match consumer preferences (Zhang et al., 2025). Other authors emphasize that taste has a greater influence on consumer preferences than health benefits, which requires greater attention to be paid to the sensory acceptability of innovative functional products (Miolla et al., 2023). Similarly, Mickiewicz and Britchenko (2022) consider taste to be a key factor in the success of demand for functional bakery products. Fortifying bakery products with functional ingredients can generate unpleasant flavors for consumers, but these effects can be prevented by protective techniques such as microencapsulation, which preserves both taste and nutritional benefits (Tolve et al., 2022). Sensory changes, including flavor and texture, influence consumer acceptance of the product; even though fortification with different functional ingredients can generate different tastes or sensations, acceptance remains sufficiently high if these changes are not extreme (Liu et al., 2022). In addition to sensory elements, consumer preferences for functional bakery products are also influenced by personal experiences, such as “green experiences,” concerns about climate change, ecological orientation and marketing communication (Nicolosi et al., 2023).

Trust in functional products increases with income and household size, suggesting that economic stability and family responsibilities positively influence the acceptance of this type of product (Chatziharalambous, Koutelidakis, 2025). Other studies indicate that significant factors determining consumers’ willingness to purchase bakery products enriched with functional ingredients include level of education, the presence of the mother in the household as the main decision-maker in food purchases, the perception that these products are healthy, and their taste (Bocog et al., 2023). The

income of the population significantly influences the consumption of functional bakery products therefore the purchase of functional bakery products is influenced by price and consumers' financial availability. The shift from cheap, high-calorie products to local, healthy and innovative products suggests that those willing to pay more opt for higher quality and functional products (Lobanov et al., 2018). The acceptance of functional bakery products is influenced by a complex combination of sensory, cognitive, socio-demographic and economic factors, and the effect of each factor may vary depending on the cultural and economic context (Mickiewicz, Britchenko, 2022). In this sense, consumer perception and motivation for these products are not uniform and commercial success depends on adapting marketing to regional differences and the type of information presented about them (Bruschi et al., 2015). The main objective of the paper is to identify key consumer attitudes towards functional bakery products and explore factors influencing consumer behavior, with an emphasis on future market development in Slovakia. Several research questions were formulated:

RQ1: What factors influence consumers' purchasing decisions regarding functional bakery products?

RQ2: What are the main reasons for consuming functional bakery products?

RQ3: What are the main drivers of the future functional bakery products market?

Materials and methods

The study involves an investigation based on a consumer survey that examines consumer behavior in the functional bakery products market in Slovakia. Questionnaire survey was carried out in 2021 on a sample of 775 consumers of functional bakery products across Slovakia and the data were collected using the snowball sampling method. The research sample can be characterized as follow: 61.7% women, 57.9% living in rural areas, 79.9% secondary education, 16.9% university education and 3.2% primary education. In terms of age, the sample includes <25 years (45.8%), 25-49 years (35.1%) and >49 years (19.1%). Most respondents in the sample are economically active people (47.5%) or students (41.4%). The sample included respondents from all regions of Slovakia, although the Nitra Region was the most strongly represented.

The research design of the survey was focused on identifying the key factors, expectations, and motivations for functional bakery products consumption. Only consumers who regularly and occasionally consume functional bakery products participated in the research.. Consumption frequency of selected types of functional bakery products namely whole grain bread, whole wheat bread, bakery products with increased protein value, bakery products with increased vitamin value, bakery products with increased mineral value, sweet pastries containing low-calorie sweeteners, sweet pastries enriched with functional ingredients were examined. Additionally, the study identified the factors influencing consumers' purchasing and consumption decisions. The respondents evaluated 19 factors using 7-point scale, where 1 represented no importance while 7 represented high importance. The scale exhibited good internal consistency reliability, as indicated

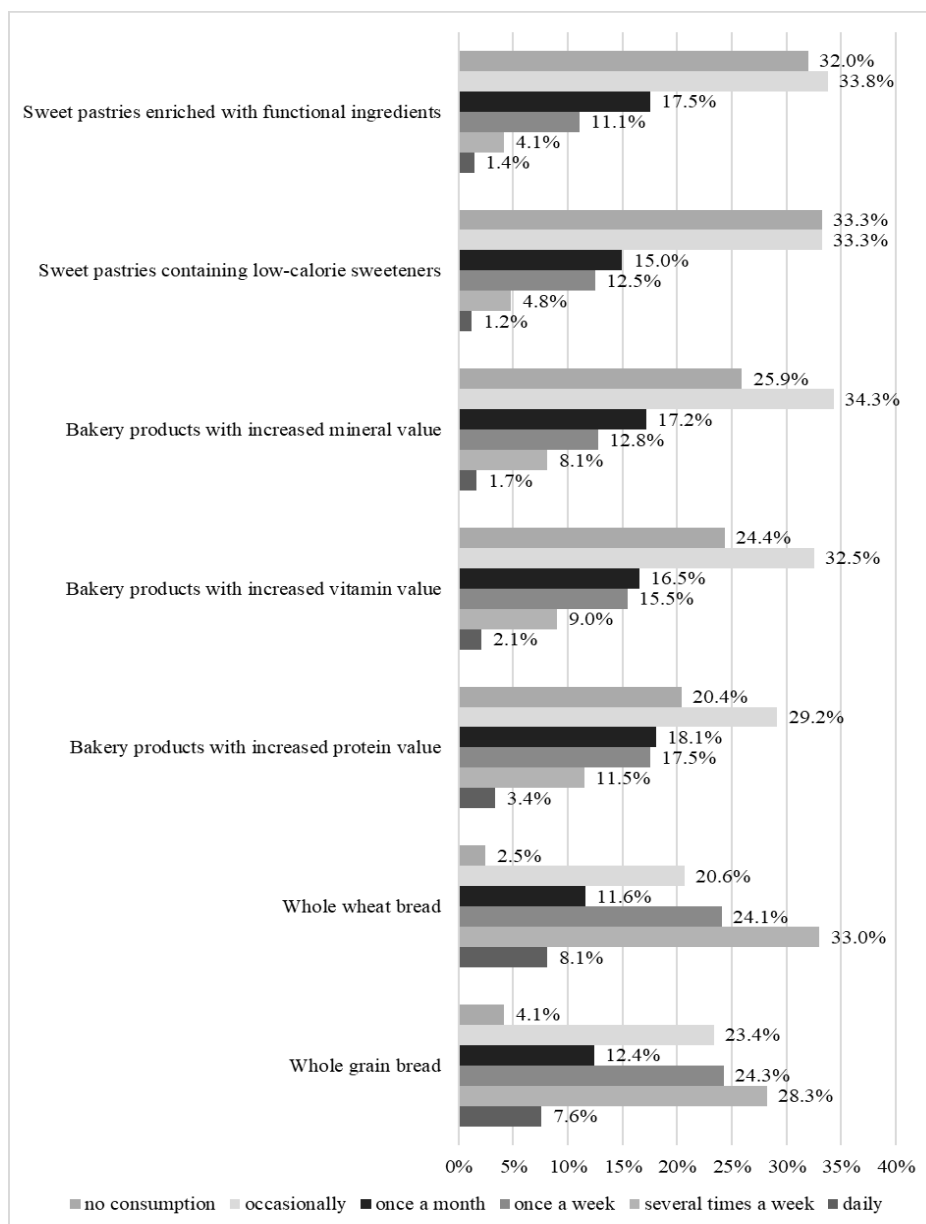
by Cronbach's alpha ($\alpha = 0.886$). Principal component analysis was applied to study relationships among variables. In addition, Kaiser–Meyer–Olkin Measure of Sampling Adequacy (KMO = 0.856) indicated very good sampling adequacy and Bartlett's Test of Sphericity ($p < 0.001$) indicated that data are highly suitable for factor analysis.

Furthermore, elements related to ingredients, such as reduced fat content, increased whole grain content, increased vitamin content, increased fruit and flaxseed content, increased fiber and mineral content, increased content of wheat, rye, and rice bran, reduced sugar content, increased content of low-calorie sweeteners, content of extruded flour from cereal crops, increased content of herbs and spices were also evaluated using a 5-point scale, where 1 representing no importance and 5 representing high importance. Statistical analysis using Friedman test and Nemenyi's procedure were applied to reveal differences in factor evaluation.

The survey also aimed to identify crucial aspects driving the consumption of functional bakery products. Respondents evaluated reasons for functional bakery products consumption on a 5-point scale, including reducing the risk of heart and cardiovascular disease, prevention of some cancers, especially colon cancer, reducing the risk of obesity due to a lower glycemic index and promoting the maintenance of a healthy weight, reducing the risk of gastrointestinal diseases and supporting the maintenance of a healthy digestive system, support the maintenance and stabilization of blood glucose levels, cholesterol lowering, support the maintenance of healthy bones and teeth, as well as healthy eyes, skin and nails, strengthening the immune system and supporting the central nervous system and mental health, reducing the risk of stroke. These consumption motives were evaluated on a 5-point scale, where 1 representing no expectation, and 5 representing high expectation. Friedman test and Nemenyi's procedure were applied to reveal differences in consumer evaluation of motives for consumption. Moreover, the survey also examined possible factors determining the future development of the functional bakery products market. Consumers identified one of the possible determinants that can influence future consumption: the expanding range of functional bakery products and the emergence of innovative functional bakery products, informing consumers about which bakery products are functional and about the health effects of consuming function bakery products, consumer interest in healthy eating, composition of functional bakery products, promotion of functional bakery products in groceries and labelling of functional bakery products on food packaging. The data collected from the survey were processed using Microsoft Excel and analyzed through statistical software XLSTAT 2022.4.1, with a significant level of 0.05.

Results

The research focused on evaluating the consumption frequency of selected functional bakery products and based on the research results shown in *Figure 1*, it can be concluded that the most preferred for consumption among Slovak consumers were whole grain bread and whole wheat bread, and on the contrary, the least consumed were sweet pastries containing low-calorie sweeteners and sweet pastries enriched with functional ingredients.

Figure 1. Frequency of bakery products consumption

Source: Own research

The results of the study revealed that more than 60% of consumers were regular consumers (consumers at least once a week) of whole grain bread and whole wheat bread. Furthermore, it should be emphasized that fewer Slovak consumers regularly consume bakery products with increased protein content (32.6%), bakery products with increased vitamin content (26.6%), bakery products with increased mineral content

(22.6%), followed by sweet pastries containing low-calorie sweeteners (18.5%) and sweet pastries enriched with functional ingredients (16.6%). The results indicated that approximately half of the consumers of functional bakery products were occasional consumers of all selected products except bread. Regarding non-consumption, sweet pastries containing low-calorie sweeteners (33.3%) and sweet pastries enriched with functional ingredients (32.0%) were the most frequently reported as not consumed among the selected functional bakery products.

The purchase of individual functional bakery products can be determined by different factors. Consumers evaluated 19 selected factors, and based on the research results and average scores, it can be concluded that freshness (mean=6.25), quality (mean=6.21), and taste (mean=5.92) are key to the selection of functional bakery products. On the other hand, the least important factor for Slovak consumers in the process of purchasing functional bakery products was product advertisement (mean=3.89). In the context of identifying the factors determining the purchase of functional bakery products, the hidden relationships between the selected factors were examined (*Table 1*).

Table 1. PCA factor loadings

Indicators	Component			
	1	2	3	4
Product advertisement	0.788			
Sales Support	0.783			
Price discount	0.717			
Point of sale	0.662			
Price of an alternative product	0.610			
Recommendation	0.523			
Price	0.453			
Origin		0.855		
Producer		0.840		
Locality		0.830		
Brand		0.764		
Freshness			0.763	
Taste			0.762	
Quality			0.722	
Type/flavor			0.637	
Aroma			0.542	
Nutritional values				0.910
Energy value				0.896
Composition				0.819

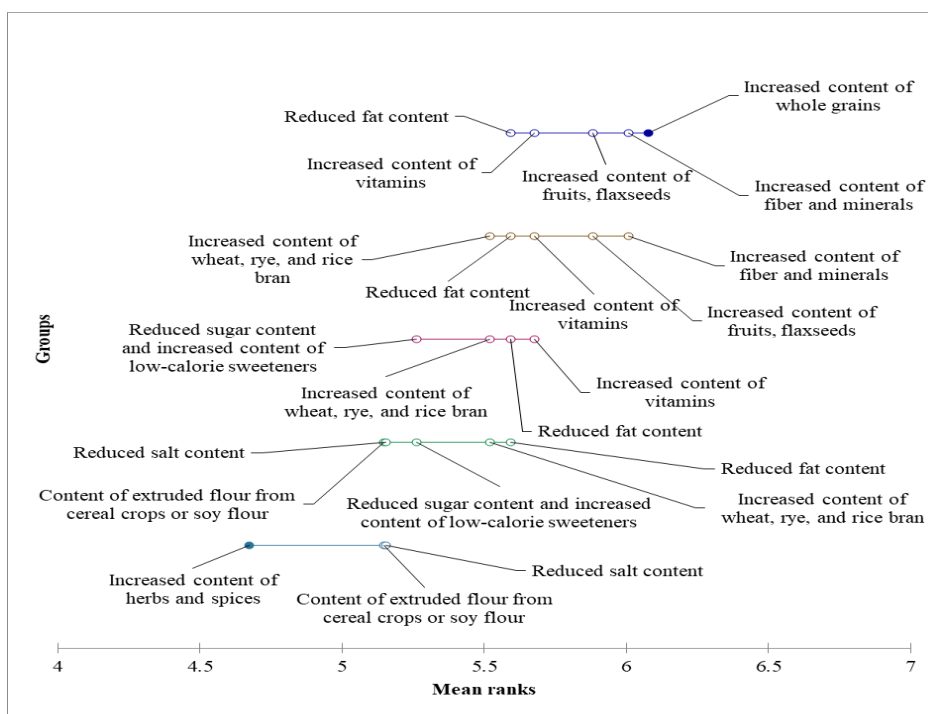
Source: Own research

The acquired results revealed 4 latent factors. The first factor involves both marketing factors such as product advertisement, sales support, recommendations as well as price factors (prices, price discount and price of alternative product). The second latent factor

comprises origin, producer, locality and brand. The third latent factor includes intrinsic factors such as taste, aroma, type/flavor, freshness and quality. The last factor consists of composition, nutritional and energy values.

In connection with the composition as one of the key determinants of the consumption of functional bakery products, it is possible to consider the content of individual components in the products as important in the selection of specific functional bakery products. For this reason, the survey was aimed at noticing selected factors related to the ingredients in functional bakery products. The research results and average scores showed that consumers most notice the increased content of whole grains (2.98), the increased content of fiber and minerals (2.91) and the increased content of fruit and flax seeds (2.91). On the other hand, they were least interested in the content of extruded flour from cereal crops or soy flour (2.64), reduced salt content (2.63) and increased content of herbs and spices (2.45). In the context of identifying the significance of individual components in functional bakery products, differences in consumer evaluation between components were also revealed by applying the Friedman test ($p\text{-value} < 0.001$). These differences are graphically represented using a Demsar plot (*Figure 2.*).

Figure 2. Composition attributes affecting functional bakery products consumption

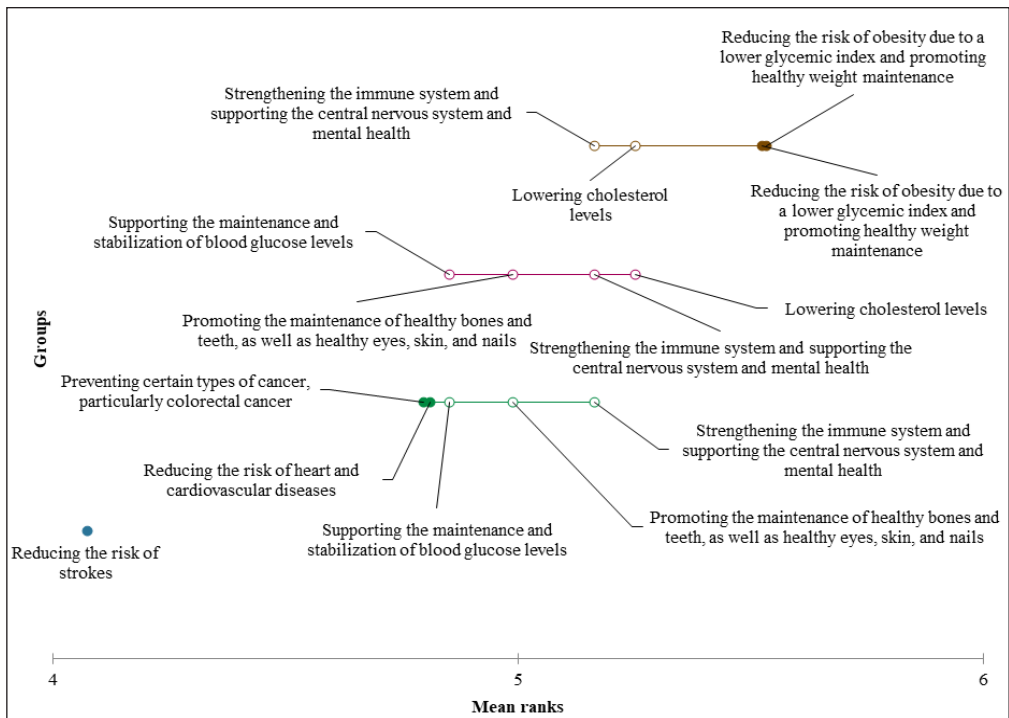


Source: Own research, Lumivero, 2026

The results and average scores revealed that Slovak consumers consume functional bakery products mainly for the reasons of reducing the risk of obesity due to a lower

glycemic index and supporting the maintenance of a healthy weight (3.49), reducing the risk of gastrointestinal diseases and supporting the maintenance of a healthy digestive system (3.48), lowering cholesterol levels (3.39), strengthening the immune system and supporting the central nervous system and mental health (3.34). Moreover, by applied the Friedman test ($p < 0.001$) and subsequently using Nemenyi's post hoc procedure, statistically significant differences between reasons for functional bakery products consumption were identified. These differences are visually represented by the Demsar plot (Figure 3.).

Figure 3. Reasons for functional bakery products consumption



Source: Own research, Lumivero, 2026

The results of the survey indicated that almost 40% of Slovak consumers consider informing consumers about features and health benefits of functional bakery products as key market drivers for the market with functional bakery products. Consumers also considered other determinants to be important, namely the interest of consumers in healthy eating (27.4%), the expanding range of functional bakery products and the emergence of innovative functional bakery products (14.2%) and the promotion of functional bakery products in commercial establishments and the labelling of functional bakery products on food packaging (11.7%). On the other hand, only 7.4% of Slovak consumers thought that the composition of functional foods can significantly influence the market of functional bakery products and their consumption in the future.

Discussions

Our consumer study conducted in Slovakia revealed low consumer awareness regarding the functional bakery products and their consumption and the results indicate that Slovak consumers most prefer whole grain bread and whole wheat bread. Similar findings were found in a study conducted by Miolla et al. (2023), emphasizing that health-conscious consumers are willing to accept enriched bread as a healthier alternative to traditional products and due to the better nutritional properties. The results show that value-added bread is the most preferred among consumers, which can be justified by higher health benefits and price affordability, and therefore the bakery market should be oriented more towards expanding the range of breads with various additives, even with a future perspective.

In the context of factors affecting purchasing and consumption of functional bakery products, our findings showed that freshness, quality and taste are the most important. Our results are consistent with the study conducted by Bocog et al. (2023) who found that taste, price, appearance, and nutritional value are key factors in the process of buying bakery products. Regarding composition factors, our study identified that consumers prefer to consume bakery products with high content of whole grains, fiber, and minerals. However, the results of the study conducted by Kušar et al. (2023) are slightly different and identified that a high protein content in bakery products is more desirable than a high fiber content. The above may indicate that consumers take into account not only sensory properties but also compounds that increase health benefits. In addition, consumers recognize environmental advantages as another reason for consuming enriched bakery products, such as those containing fiber (Królak et al., 2020) and insect flour (Amoah et al., 2023), which could be an important aspect for future choices of bakery products.

Our study further revealed that the future development of the functional bakery product market may be determined mainly by higher consumer awareness of health benefits and an overall interest in healthy eating, which is currently insufficient. This is confirmed by Miolla et al. (2023) who emphasized that lack of knowledge about enriched bread and according to Nilova and Malyutenkova (2020) consumers should be informed about health benefits through e-commerce. Furthermore, considering global trends and recommendations for healthy eating, consumers need to be informed about the beneficial properties of functional bakery products to gain awareness that bakery products are the most affordable healthy and nutritious foods (Mickiewicz, Britchenko, 2022). For the future positive development of functional bakery products, it is appropriate to educate consumers through various communication methods and offer new value-added bakery products that meet consumer requirements for sensory and health aspects.

Conclusions

The key findings of the study include insufficient consumer awareness regarding the consumption of functional bakery products, which appears to be associated with

their low frequency of consuming bakery products enriched with health-beneficial substances or those with reduced levels of health-harmful compounds. Additionally, it was identified that functional bakery products selection is affected by product features, factors associated with consumer considerations, and marketing and packaging elements. For Slovak consumers, bakery products with added fiber, minerals, whole grains, fruits, and flaxseeds are particularly appealing. The study further identified the future perspectives of functional bakery products, as consumers recognize the health benefits of consumption, including immune system support, nervous system support, mental health, cholesterol reduction, and reducing the risk of obesity. Overall, the findings suggest that higher consumer awareness of the features and health benefits of functional bakery products may support more informed decision-making and contribute to the development of functional bakery market. The findings of the consumer study in Slovakia have significant implications for both science and practice. From a scientific perspective, the study helps to understand consumer preferences and behavior on the functional bakery market with an emphasis on factors, reasons, and perspectives related to the consumption of functional bakery products. These findings should be beneficial for researchers looking for novel approaches to enhance functional bakery goods and new ingredients that satisfy consumer demand. The study's findings are also beneficial for producers in the bakery industry, as they can utilize them for the development, production, and sale of functional bakery products that align with consumer preferences, thereby promoting positive market growth for bakery products. In addition, producers should focus on creating marketing strategies that emphasize the health benefits of consumption and transparent labelling of functional bakery products. The study results may also be valuable for policymakers who should implement educational campaigns to increase consumer awareness of functional bakery products to support public health.

Despite the valuable insights, consumer study has limitations. The findings are based on the survey conducted in Slovakia and may not be fully generalizable to other countries with different cultural and socio-economic conditions. Additionally, a limitation is the application of self-reported measures in the process of acquiring information from consumers. Following the study's findings, future research directions should consider expanding the scope of investigation, incorporating diverse cultural contexts. Conducting a more comprehensive study is essential to understand the differences in consumer behavior across various countries.

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Conflict of interests

The authors declare no conflict of interest.

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