

Summary of PhD thesis

The role of functional food in healthy ageing: a consumer research perspective

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Budapest, 2022

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1. Introduction and aims of the study

The proportion of older adults in the population is significantly growing. Based on Eurostat data in the European Union, almost one-fifth of the population was over the age of 65 years in 2018, and their relative proportion in the population is expected to reach 28.5% until 2050. According to World Health Organisation data, CNDs (chronic non-communicable diseases; primarily cardiovascular diseases, cancers, chronic respiratory diseases and diabetes) are the leading cause of death (71% in 2016) worldwide. Most of these health problems are strongly connected to diet, and significantly impair the quality of life and life expectancy of those affected. Therefore, the relationship between healthy ageing and nutrition has become an emerging scientific and social issue. Functional food products with nutritional composition that may reduce the risk of diet-related diseases or enhance physiological functions could play an important role in disease prevention and mitigation. Consumers often refer to the functional food products with the 'healthy food' term, although this term is not correct from neither academic, nor a legal point of view. The functional food market is one of the fastest growing area of the food industry. However, new products had a high

failure rate, because most of them were not preceded by a deeper exploration of consumer needs. Although increasing the well-being of older consumers has been a key consideration since the emergence of the concept of functional food, only few consumer research studies are available which focus on senior consumers.

The present study is based on two quantitative consumer samples: a nationwide-representative sample (N = 1002; representative for the total adult Hungarian population in terms of sex, age and NUTS-2 geographical distribution, according to the latest official census data) and a specific older adult large sample (N = 907; 60 years or over) were collected. The research followed an explorative approach focusing on the central areas of functional food development with supply chain approach. Hence, it covers nutrition claims, carrier types, health concerns, the acceptance of functional food for disease prevention and mitigation, other factors influencing the purchase decision, consumer knowledge, attitudes and socio-demographic factors.

The research included a large number of variables from which factors were composed with PCA (principal component analysis) for better interpretation. Among

older adults heterogeneity was identified in the preference of nutrition claims listed in the Regulation (EC) No. 1924/2006, therefore, cluster analysis was conducted to form consumer segments.

The aims of this study were:

- To evaluate the perception of older adults about health-related functionality of foods compared with other age groups;
- To define well-distinguished consumer segments among older adults based on preference of nutrition claims;
- To explore connection between health status and nutritional preferences of older adults.

2. Summary of the results

2.1. Nationwide representative sample

The findings of the representative survey highlight statistically significant ($p \leq 0.05$) differences in the preferences of older adults compared to other age segments. Based on the results, older adults tend to define the 'healthy food' term from a food safety point of view, while younger respondents described this category from nutritional aspects. Senior consumers generally accept functional foods. In case of most of the knowledge-related questions, younger respondents had a higher level of knowledge. Senior consumers preferred most of the listed nutrition claims more, especially to the following ones: increased vitamin, mineral, protein and fibre content. Older adults also preferred products with lower salt and sugar content, which were less relevant for other age groups. Products of fruit and vegetable origin and fish were distinguished as carriers of functional traits. Compared to other age groups, older adults accept products of animal origin (especially dairy products and honey) on a higher level. Most of the listed product benefits (e.g. domestic origin, small-scale product) were preferred by the older adults to a higher extent. It indicates

that the combination of these product parameters with health and nutrition claims on the product label could bear a recognised value for senior consumers. The results of the present study indicate that the Hungarian population is mainly concerned about the following health problems: vision deficiencies and disorders; dental problems; and heart and cardiovascular diseases. According to the responses, functional foods were the most suitable for disease prevention and mitigation in case of digestive problems, high cholesterol level, lactose sensitivity and gluten sensitivity. In the vast majority of the cases where significant differences were detected, older adults were more concerned about the certain health problem. After filtering the sample only for the concerned consumers, less significant differences between age groups were detected. Where significant differences were found, younger and middle-aged adults are more likely to accept food as a solution to disease prevention and mitigation. According to these findings, health concerns are more influential in the acceptance of functional foods for disease prevention and mitigation than the consumers' age.

The results of the analysis of the nationwide representative survey highlighted the importance of considering the well-being of older adults (especially consumers concerned about health problems) during product development. This investigation might be used for product differentiation between age groups, while explored differences between preferred shop types, communication channels and other factors influencing the purchase decision could also support the positioning of messages related to product promotion or intervention. The analysis contains a detailed data set about possible carrier types and nutritional claim combinations that might be used for subsequent academic studies and for field experts as well.

2.1. Older adult specific sample

According to the results of the analysis of the specific older adult sample, senior consumers primarily preferred claims indicating added nutritional value, while reduced nutritional content was less preferred. Three segments were identified and characterised based on their preference of nutrition claims:

- Nutrition-oriented (33%)
- Added nutritional value oriented (46.5%)
- Nutrition sceptic (20.5%).

Previous studies identified scepticism among older adults about functional food products. However, the results of the present study suggested that scepticism was not general among older adults. Eighty percent of the senior consumers could be an appropriate target group for functional food market actors, since 33% was generally nutrition-oriented, while 46.5% rather searches added value. Only one-fifth of senior consumers found to be resilient against functional food value offers. As an unexpected finding, age, income level, education and location of residence did not differentiate the groups significantly. However, the sex of the respondents was

found to be a significant factor: men were present in the highest proportion in the 'nutrition sceptic' segment. Older adults in the 'nutrition-oriented' segment were concerned about presented health problems at the highest rate in each case except in the case of digestive problems, where the 'added nutritional value oriented' segment demonstrated higher level of concerns. Consumers in the 'nutritional sceptic' group were the least concerned about the listed health problems. The proportion of overweight respondents was the highest in the 'nutrition-oriented' group, while the proportion of obese respondents was the highest in the 'added nutritional value oriented' segment. Significant differences about the acceptance of functional foods as a solution to disease prevention and mitigation were observed only in a few cases. For heart and cardiovascular diseases, dental problems and digestive problems, the results suggested that the 'nutrition-oriented' segment had the highest rate of acceptance, followed by the 'added nutritional value oriented' segment, while the 'nutrition sceptic' consumer group was characterised by the lowest level of acceptance. The proportion of overweight respondents was highest in the 'nutrition-oriented' group, while the proportion of obese respondents was the highest in the 'added nutrition value

oriented' segment, while respondents with normal BMI (body mass index) can be found in the 'nutrition sceptic' segment in the highest rate. The results suggest that older adults primarily pay attention to their nutrition due to existing health problems instead of prevention. To overcome this barrier, several practical findings were presented in terms of carrier types, attitudes, socio-demographic characteristics and other factors influencing purchase decisions.

Considering that the prevention of CNDs and the well-being of older adults are serious social challenges, there are tasks for both the food business operators in the development of accessible functional food products for older adults and policy makers in forming more effective health prevention programmes to promote healthy ageing. Further studies focusing on older adults are needed to investigate possible product attribute combinations that meet the expectations of specified segments of senior consumers.

3. New and novel scientific results

1. The perception of Hungarian older adults about health-related functionality of foods was significantly more positive compared to other age groups.

2. In case of Hungarian consumers, health concerns are more influential in the acceptance of functional foods for disease prevention and mitigation than the age of the consumers.

3. Preferences of Hungarian older adults for nutrition claims are heterogeneous according to the cluster analysis of large (N = 907) consumer sample: 33% is nutrition-oriented in general, 46.5% appreciates added value, and only 20.5% of the senior respondents is identified as nutrition sceptic.

4. Hungarian older adults pay special attention to nutrition due to existing health problems instead of prevention.

5. Most valued carrier foods for the Hungarian elder consumers found to be the following: fruits and vegetables, fish, yoghurt and honey. Most important nutrition claims are related to vitamin, mineral, protein and fibre content.

6. Most of the socio-demographic aspects (including location of residence, level of education, income) except the sex of the respondents does not influence health-related dietary preferences of older adults in Hungary.

4. Publications related to the topic of the dissertation

4.1. Full text papers in peer-reviewed journals with impact factor

Szakos, D., Ózsvári, L., & Kasza, G.: **Health-related nutritional preferences of older adults: a segmentation study for functional food development.** *Journal of Functional Foods*, 92. 105065, 2022.

Szakos, D., Ózsvári, L., & Kasza G.: **Perception of Older Adults about Health-Related Functionality of Foods Compared with Other Age Groups.** *Sustainability*, 12(7). 2748, 2020.

Szakos, D., Ózsvári, L., & Kasza, G.: **What makes a food "healthy"? - Functional food product path planning by evaluating the opinions of consumers from different age groups.** *Magyar Állatorvosok Lapja*, 143(7).439-447, 2021.

Szabó, E., Szakos, D., Kasza, G., & Ózsvári, L.: **The analysis of the target group of lactose-free functional foods for product development.** *Acta Alimentaria*, 50(2). 153-161, 2021.

Szabó, E., Szakos, D., Kasza, G., & Ózsvári, L.: **The legal background and institutional system of milk hygiene**

in Hungary. *Magyar Állatorvosok Lapja*, 141(3). 181-191, 2019.

4.2. Full text papers in peer-reviewed journals without impact factor

Szakos, D., Ózsvári, L., & Kasza, G.: **Consumer demand analysis in the Hungarian functional food market focused on the main health problems.** *Gradus*, 7(1) 62-66. 2020.

Kuti, B., Horacsek, M., Szakos, D., & Kasza, G.: **Regulation of nutrition labeling of foods in the European Union and Hungary; A historical review from the beginning of the present day.** *Journal of Food Investigation*, 67(1). 3269-3280, 2021.

4.3. Presentations at international conferences

Szakos, D., Ózsvári, L., & Kasza, G.: **Perception of older adults about health-related functionality of foods.** In: Kiss, O. (Ed.): *18th Wellmann International Scientific Conference, Book of Abstracts*, 69. Hódmezővásárhely, Hungary: University of Szeged, 3 May 2021.

Szabó, E., Szakos, D., Kasza, G., & Ózsvári, L.: **A tejhigiénia jogszabályi háttere és intézményrendszere Magyarországon.** In: Szenci, O., Brydl, E. (Eds.): *29th*

International Congress of the Hungarian Association for Buiatrics, 70-74. Hévíz, Hungary, 13-16 November 2019.

Szakos, D., Ózsvári, L., Temesi, Á., & Kasza, G.: **Consumer demand analysis in the Hungarian functional food market.** In: Dalmadi, I., Baranyai, L., Nguyen, Q.D. (Eds.): *Third International Conference on Food Science and Technology, Book of Abstracts, 160.* Budapest, Hungary: Szent István University 30 November – 1 December 2018.

Szakos, D., Temesi, Á., Ózsvári, L., & Kasza, G.: **Consumer Acceptance of Functional Food Products – Risk Aspects.** In: Géczy, G., Korzenszky, P. (Eds.): *Researched Risk Factors of Food Chain, XIX. Risk Factors of Food Chain Conference, 111-114.* Mátrafüred, Hungary: Szent István University, 26-28 September 2018.

4.4. Presentations at Hungarian conferences

Szakos, D., Ózsvári, L., & Kasza, G.: **Az életkor hatása az élelmiszerek egészséggel összefüggő funkcionalitásának megítélésére.** MTA Akadémiai Beszámolók, Budapest, Hungary, 2021.

Szabó, E., Kasza, G., Szakos, D., & Ózsvári, L.: **Laktózérzékeny vásárlók élelmiszer-fogyasztási**

szokásai. MTA Akadémiai Beszámolók, Budapest, Hungary, 2020.

Szakos, D., Ózsvári, L., & Kasza G.: **Consumer demand analysis in the Hungarian functional food market focused on the main health problems.** In: Hoyk, E. (Ed.): *Környezettudományi és Analitikai Műhelykonferencia, Book of Abstracts, 38-39.* Kecskemét, Hungary: Neumann János Egyetem, 30 April 2019.

Szakos, D., Temesi, Á., Ózsvári, L., & Kasza, G.: **Funkcionális élelmiszerek fogyasztói elfogadottsága egyes egészségügyi aggodalmak tükrében.** In: Szalka, É. (Ed.): *Fenntartható agrárium és környezet, az Óvári Akadémia 200 éve – múlt, jelen, jövő. XXXVII. Óvári Tudományos Napok, Konferencia kiadvány II. kötet, 20-27.* Mosonmagyaróvár, Hungary: Széchenyi István University, 9-10 November 2018.

Szakos, D., Ózsvári, L., & Kasza, G.: **Funkcionális élelmiszer termékpálya tervezése az idősebb korú fogyasztók igényei alapján.** In: *XII. Hungalimentaria konferencia és kiállítás: „Ésszel a kosárba! – Mit mond erről a labor?”, 104-105.* Budapest, Hungary, 24-25 April 2019.

Szakos, D., Ózsvári, L., & Kasza, G.: **Funkcionális élelmiszer termékpálya tervezése egészségügyi aggodalmak alapján – idős korú fogyasztók.** MTA Akadémiai Beszámolók, Budapest, Hungary, 2019.