

Sustainable Agricultural Production, Organic Farming, Future Opportunities, Trends, Consumption Habits and Priorities

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Abstract

Organic farming has emerged as a cornerstone of sustainable agricultural practices, offering solutions to environmental degradation, biodiversity loss, and soil depletion. This study provides a comprehensive analysis of the role of organic farming in Hungary, exploring its economic, environmental, and social impacts. Using a mixed-methods approach, it examines consumer behavior, sustainability challenges, and opportunities for market expansion. The findings emphasize the potential of integrating circular economy principles to enhance resource efficiency and minimize environmental burdens in agricultural systems. Furthermore, the implications for fostering circular societies and advancing circular tourism are considered, demonstrating the broader significance of sustainable practices in rural development. Special attention is given to Hungarian consumers' attitudes, highlighting the barriers and opportunities for adopting organic products. This research contributes to the discourse on sustainable development by aligning organic farming with innovative, circular approaches to production and consumption.

Keywords: *Sustainable Agriculture, Organic Farming, Circular Economy, Circular Society, Circular.*

Introduction

Organic farming, also known as ecological farming, is gaining increasing attention today, particularly due to the growing demand for sustainability. This form of agriculture not only focuses on environmental protection but also facilitates the production of healthier, chemical-free food. Sustainable agriculture has emerged as an alternative to intensive cultivation techniques, addressing the environmental and social issues caused by conventional farming, such as soil degradation, water pollution, and the decline of biodiversity. Integrating circular economy principles into sustainable agriculture offers a promising pathway to addressing resource efficiency and environmental challenges. Adopting circular economy practices not only supports environmental sustainability but also aligns with community-focused initiatives, such as promoting local resource reuse and enhancing the lifecycle of agricultural inputs. These principles foster more resilient agricultural systems that minimize reliance on external inputs, reduce environmental footprints, and encourage collaborative efforts among stakeholders (Remsei et al., 2023, Szigeti et al., 2023).

In Hungary, ecological farming is a particularly relevant topic, as agriculture plays a significant economic and social role. Addressing sustainability challenges, preserving natural resources, and adopting environmentally friendly technologies are essential for ensuring the long-term viability of rural communities. Cooperation is also very important because it enables stakeholders to share knowledge, resources, and best practices, fostering innovative solutions that can accelerate the transition to sustainable agricultural practices and strengthen rural economies. (Baranyai et al, 2018; Papp-Váry et al, 2019)

The purpose of this thesis is to provide a comprehensive overview of the state and importance of organic farming, with a specific focus on Hungary. The research is based on three main hypotheses:

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- Organic farming can be effectively implemented in smallholder systems, contributing to sustainability.
- The combination of traditional conservation methods and modern technologies can reduce the use of synthetic chemicals, thereby enhancing sustainability.
- Hungarian consumers' price sensitivity hinders the broader adoption of organic products.

This study relies on a combination of literature sources, primary research, in-depth interviews, and questionnaire surveys to explore the economic, environmental, and social impacts of organic farming. This study also considers the implications of circular economy practices for enhancing sustainability within agricultural systems. Special attention is given to Hungarian consumers' attitudes toward organic products, their purchasing habits, and the economic opportunities supporting sustainability.

Theoretical Background

The development of sustainable agricultural systems is one of the most significant environmental and economic challenges of our time. The spread of intensive agriculture has had a considerable impact on the environment, particularly through soil degradation, water pollution, and biodiversity loss. Organic farming offers an alternative solution to these problems, relying on the use of natural processes and resources while avoiding synthetic chemicals.

Environmental Problems in Agriculture

Sustainability is a serious issue that spans generations, highlighting the importance of cultivating awareness about the long-term impacts of human activity on natural resources and ecosystems. (Lukács et al, 2023; Szeberényi et al, 2022; Szeberényi - Papp-Váry, 2021) As environmental issues intensify, universities and organizations alike are being called upon to align their operations with sustainability goals, ensuring that both current and future generations are equipped to address these challenges effectively (Miah et al., 2024a; Miah et al., 2024b; Vinkóczy et al., 2023) The primary environmental issues associated with intensive agriculture include soil nutrient depletion, overexploitation of water resources, and biodiversity loss. The use of synthetic fertilizers and pesticides causes long-term damage to soil structure and threatens the sustainability of natural resources. Additionally, monocultural farming systems contribute to soil erosion and reduce the soil's regenerative capacity. Water pollution and excessive water use are also critical factors commonly associated with intensive agricultural systems.

Opportunities in Organic Farming

The goal of organic farming is to reduce environmental burdens and establish sustainable production systems. The integration of circular economy principles in tourism and agriculture has been extensively reviewed by Kabil et al. (2024), emphasizing its potential to transform resource-intensive practices into sustainable models. Economic measures promoting entrepreneurship in agriculture can enhance the development of organic farming, as seen in comparative analyses between Slovakia and Hungary (Mura et al., 2022b). Key ecological farming practices include crop rotation, composting, and green manuring, all of which help preserve soil fertility. These practices promote biodiversity, reduce soil erosion, and support sustainable water management.

Through the use of biological pest control methods and natural fertilizers, organic farming minimizes the application of synthetic chemicals, which has positive effects not only on the environment but also on human health. Furthermore, organic farming can help lower the energy demands of agriculture, particularly by utilizing local and renewable energy sources.

Economic and Social Aspects

The economic advantages of organic farming include reduced costs for chemicals, increased demand for organic products, and long-term sustainability that ensures the stability of productivity. However, organic farming is more labor-intensive and may require initial investments, which can hinder its widespread adoption.

From a social perspective, organic farming contributes to the viability of rural communities and strengthens local economies. However, the COVID-19 pandemic has significantly impacted employment rates in Hungary and Slovakia, exacerbating economic challenges in rural areas (Mura et al., 2022a) (Kórmüves et al., 2022; Poór et al., 2024). Moreover, vulnerable groups such as disabled individuals faced additional workforce challenges during the pandemic, highlighting the need for inclusive employment opportunities in sectors like organic farming (Jenei et al., 2024).

Relying on local markets and direct sales channels helps to build stronger connections between farmers and consumers, while improving access to healthier food positively impacts public health. The pandemic also impacted human resource management practices (Kórmüves et al., 2024), necessitating adaptations in various sectors including agriculture (Jenei & Módosné Szalai, 2021). Furthermore, the responsibility of employers and employees regarding hygiene has become increasingly important during the pandemic, affecting agricultural practices as well (Poór et al., 2021; (Kórmüves et al., 2022; Bódis & Papp-Váry, 2021; Kangai et al., 2024).

Recent studies have further elucidated the impact of external factors, such as economic crises and global pandemics, on sustainability practices and consumer behavior. Tóth et al. (2022) emphasize the importance of motivational dimensions in shaping consumer engagement with sustainable products. The challenges posed by the COVID-19 pandemic are documented extensively, particularly its influence on unemployment rates and labor market adaptability in Hungary and other countries (Tóth et al., 2023; Kálmán et al., 2021). Moreover, the pandemic underscored the necessity of resilience in financial attitudes and sustainable financial practices among university students, as examined by Zéman et al. (2023). On a broader scale, the integration of sustainability principles in national branding strategies offers a pivotal pathway for enhancing global competitiveness (Kálmán & Grotte, 2023). These findings highlight the intricate interplay between economic disruptions, consumer behavior, and sustainability initiatives, reaffirming the critical role of interdisciplinary research in advancing organic farming and related sustainable practices.

Innovation and Organic Farming

The success and advancement of organic farming largely depend on innovations that promote sustainability and competitiveness. The close relationship between organic farming and technological developments provides farmers with opportunities to improve productivity while minimizing environmental impacts. Innovations include modern technological solutions such as precision agriculture, which optimizes production processes through sensors and data analysis systems. The practical application of circular economy principles, as discussed in CIRCULAR ECONOMY (BERLIN) (2024), can significantly enhance the sustainability of agricultural systems through resource optimization and waste minimization. These technologies enhance water-use efficiency, reduce soil erosion, and refine pest management practices.

Research and development also play a key role in devising new sustainable techniques. Innovations in organic farming include biological pest control solutions that offer alternatives to synthetic chemicals, and organic fertilization methods that maintain soil nutrient levels. These advancements not only improve production efficiency but also help to minimize environmental burdens. Corporate culture and leadership play crucial roles in implementing sustainable practices, as they influence HR strategies and CSR activities within organizations (Módosné Szalai & Jenei, 2021). Innovation is thus the cornerstone of the future of organic farming, enabling farms to meet market demands while achieving sustainability goals.

Large-Scale Farms or Smallholdings?

The question of farm size is critical from the perspective of organic farming, as both large-scale and smallholding systems offer distinct advantages and challenges. Smallholdings are better able to adapt to local environmental conditions and apply more tailored methods to production. In organic farming, family-run operations often demonstrate greater commitment to sustainability principles, as the farm's operations are closely linked to the farmers' lifestyles and values.

On the other hand, large-scale farms benefit from economies of scale, enabling them to implement modern technologies more efficiently, such as drones, sensors, and data analytics solutions. These technologies can enhance productivity and reduce production costs. However, large-scale farms often face difficulties in maintaining biodiversity and ensuring the long-term sustainability of soil and natural resources.

The optimal approach often lies in a combination of the two: leveraging the resources and technological advantages of large-scale farms alongside the environmental sustainability of smallholder systems can contribute to developing an agricultural model that is both economically viable and environmentally sustainable.

Hungarian Consumers and Organic Foods

The demand for organic foods among Hungarian consumers is influenced by several factors, with price, availability, and health awareness being the most significant. Hungarians are missing a very important food group in their diet, which is essential if they want to eat consciously and healthily: fish, which is present in very small amounts in their diet (Ivancsóné and Kórmíves, 2016). In addition to healthy eating, local and regional monographs, which usually include chapters on nutrition and folk dishes, also help document the regional characteristics of folk gastronomy (Kórmíves and Vehrér, 2024). However, Hungarians should offer more local and organic food to our foreign guests. By consciously varying cooking methods and techniques, the prepared dishes would better meet the changing needs of customers (Kórmíves, 2018). The demand for organic products in Hungary shows a growing trend, driven in part by an increasing interest in healthy lifestyles and a commitment to sustainability. Public opinion in Hungary reflects a strong concern for sustainability and environmental protection, which can influence consumer choices towards organic products (Remsei et al., 2023; Szeberényi et al, 2022; Papp-Váry et al, 2023). However, higher prices often act as a deterrent, particularly for price-sensitive consumers.

Education plays a key role in ensuring that consumers understand the benefits of organic foods. Proper awareness campaigns can encourage long-term consumer preference for organic products, even at higher prices. Direct sales forms, such as farmers' markets and community-supported agriculture models, may gain popularity as they provide consumers with opportunities to connect directly with producers and verify the quality of products.

The organic food market in Hungary holds significant growth potential, especially if price sensitivity can be mitigated through measures such as government subsidies or targeted consumer campaigns. Strengthening sustainability-focused consumer behavior and stimulating demand for organic products are essential for further market development.

Theoretical Presentation of Qualitative and Quantitative Research Methodologies

The choice of research methodologies fundamentally determines the effectiveness, reliability, and relevance of a scientific study. Qualitative and quantitative research methods offer different approaches that are suitable for addressing various types of research questions.

Quantitative Research Methodology

Quantitative research focuses on the collection, analysis, and interpretation of numerical data, aiming to investigate phenomena in an objective and quantifiable manner. This method is widely used in natural and

social sciences, where researchers seek to test predefined hypotheses and draw general conclusions (Bryman, 2016).

Key Characteristics of Quantitative Research

- **Structured data collection:** Data is typically gathered using questionnaires, tests, or other predefined tools.
- **Statistical analysis:** Collected data is processed using statistical methods to identify relationships and trends.
- **Generalizability:** Results from representative samples can be extended to larger populations.

The advantage of quantitative research lies in its ability to provide precise, objective results. However, it is limited in its capacity to offer deeper insights into the underlying causes and contexts of the phenomena studied (Creswell, 2014).

Qualitative Research Methodology

Qualitative research focuses on the in-depth and detailed understanding of social phenomena. This approach is particularly suitable for exploring complex, contextual questions where the goal is to uncover human experiences, opinions, and emotions (Flick, 2018).

Key Characteristics of Qualitative Research

- **Flexible methodology:** The research process often adapts to newly discovered information.
- **Rich data collection:** Data is presented in textual, visual, or narrative forms, collected through interviews, observations, or document analysis.
- **Small sample size:** Typically works with smaller samples, as the aim is to examine individual cases thoroughly rather than generalize.

Its advantage lies in providing deep, context-sensitive insights, though it is time-consuming and its results are not easily generalizable (Silverman, 2017).

Comparison and Integration of the Two Methods

Due to their different approaches, quantitative and qualitative research methods often complement each other. While quantitative research provides objective, numerical results, qualitative methods help uncover underlying processes and reasons. The combined, or "mixed-methods," approach allows researchers to leverage the strengths of both methods, offering a holistic understanding of the studied phenomenon (Teddlie & Tashakkori, 2009).

Primary Research

Summary of the in-Depth Interview

As part of the qualitative research for the thesis, an in-depth interview was conducted with the founder of Zöld Tanya Community Organic Garden. The purpose of the interview was to explore the practical operations, challenges, and opportunities of organic farming from the perspective of sustainability.

Motivation for Organic Farming

The founder's primary motivation stemmed from a commitment to a healthy lifestyle and high-quality nutrition. They believe that modern agriculture focuses excessively on quantity, often at the expense of natural flavors and the long-term fertility of the soil. This belief led to the establishment of their farm, which prioritizes the production of nutrient-rich crops and sustainability.

Principles of Organic Farming

Zöld Tanya operates based on close collaboration with nature. Soil fertility is maintained exclusively through the use of organic fertilizers, and biodynamic seeds are utilized. Pest control is carried out using natural biostimulants, which enhance the resilience of plants. The preservation of biodiversity and a chemical-free approach are central to the farm's operations.

Challenges and Opportunities

During the interview, the founder highlighted that one of the greatest challenges of organic farming is its high labor intensity and the need to maintain competitive pricing. Although the production costs of organic products are higher, an increasing number of consumers value quality, which is a source of optimism. Nevertheless, price sensitivity and a lack of consumer awareness continue to hinder the broader adoption of organic products.

Future Challenges and Proposed Solutions

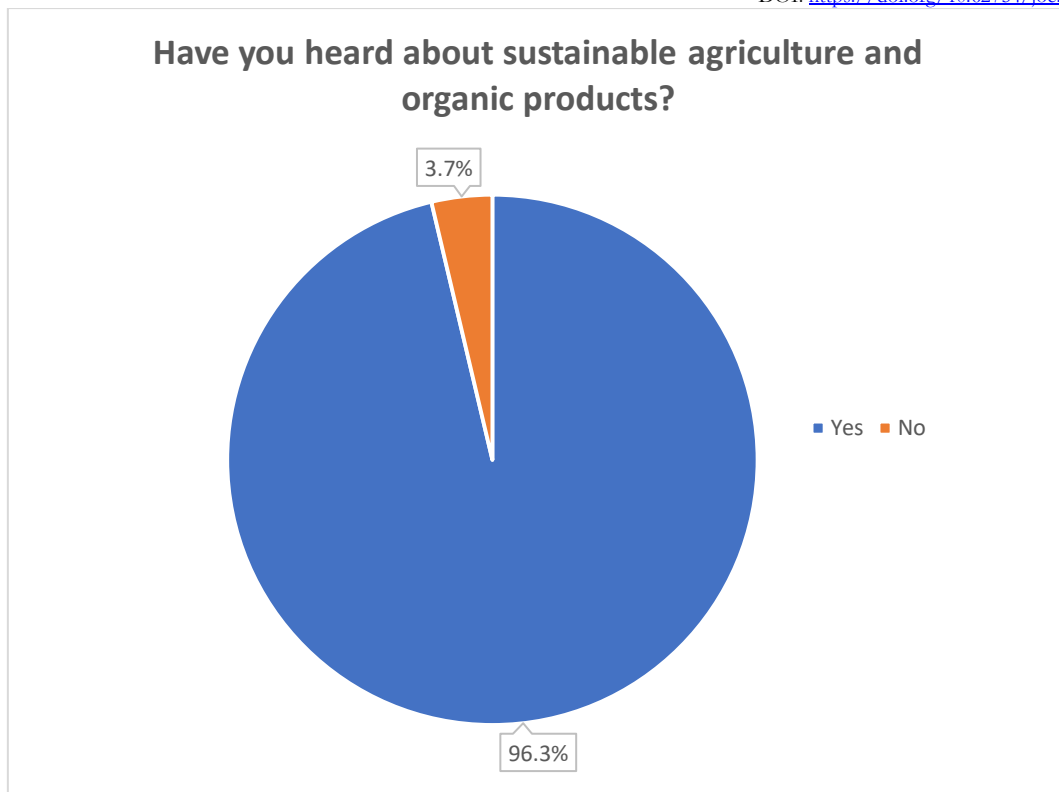
The founder emphasized the necessity of increasing consumer awareness to promote the spread of organic products. This could be achieved through educational campaigns and the involvement of educational institutions and media. They also stressed the importance of strengthening direct producer-consumer relationships, such as through farmers' markets or community-supported agriculture programs. Additionally, they believe that expanding government subsidies and reducing the prices of organic products are key to further market development.

Summary of the Questionnaire Survey Results

The purpose of the questionnaire survey was to explore the attitudes of the Hungarian population toward organic foods, their purchasing habits, and their views on sustainability. The survey was conducted online using Google Forms, with a total of 109 respondents completing the questionnaire. The analysis of the data included various graphical representations of responses to individual questions.

Awareness and Attitudes Toward Organic Foods

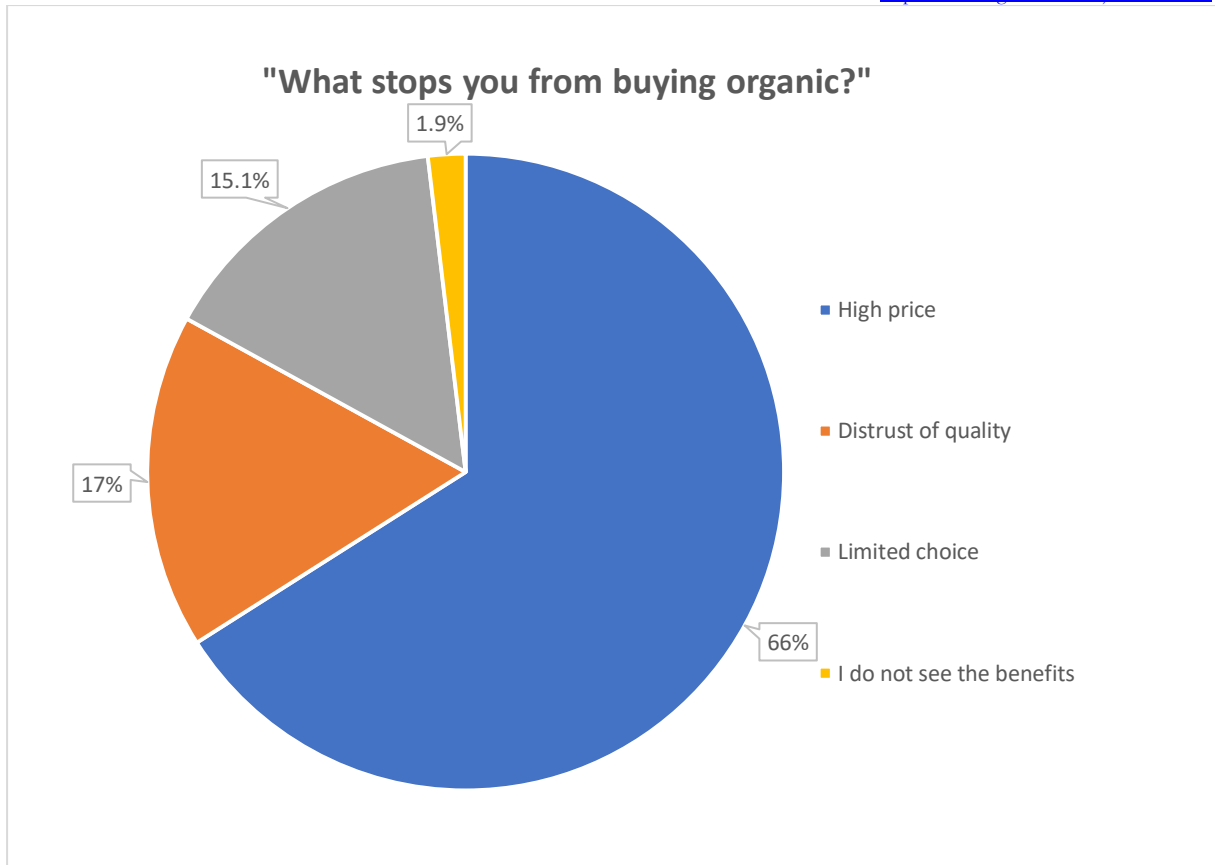
A notable 96.3% of respondents reported having heard about sustainable agriculture and organic products, indicating a high level of awareness. The most common reason for purchasing organic products was health preservation (62.6%), followed by a commitment to environmentally friendly production methods (18.7%) and taste quality (11.2%). These results suggest that personal health and food quality are the most important factors for consumers when it comes to choosing organic products.



Source: Own compilation

Barriers to Purchasing

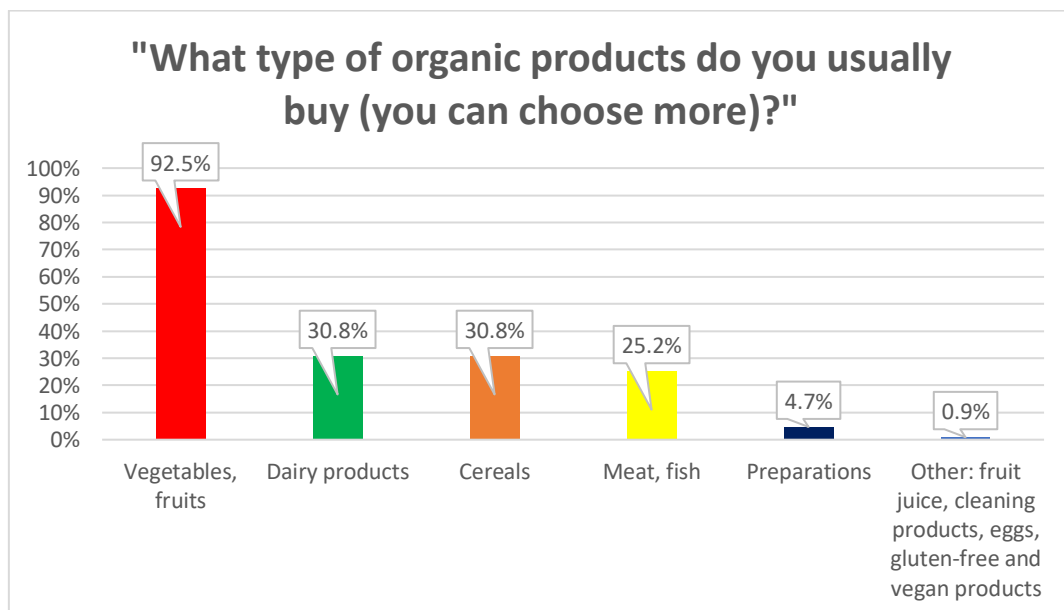
One of the key findings of the survey is that the high price of organic products is the main barrier to their broader adoption. A significant 66% of respondents cited high prices as the primary factor deterring them from purchasing organic products, while limited availability and distrust in product quality were also notable obstacles. Only a small proportion (1.9%) stated that they do not see any advantages in organic products.



Source: Own compilation

Purchasing Habits

The majority of respondents (73.4%) purchase organic products a few times a month, while only 14.7% do so on a weekly basis. The most popular organic products are vegetables and fruits (92.5%), followed by dairy products (30.8%) and grains (30.8%). Online shopping has a minimal presence, with only 2.8% of respondents choosing this option, while supermarkets dominate as the primary purchasing locations.



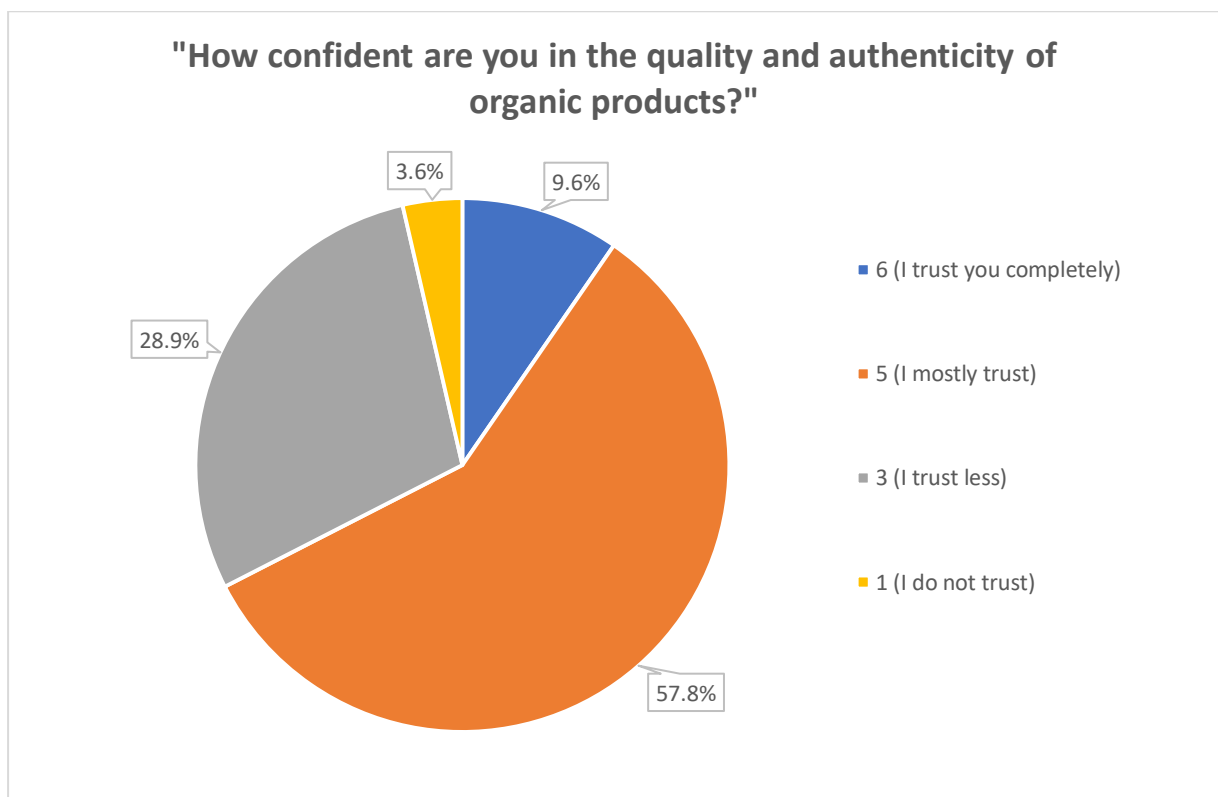
Source: Own compilation

The Role of Sustainability

Sustainability, while an important factor, is not always a primary consideration when purchasing food. For 11% of respondents, it is a crucial aspect, while 39.4% consider it important but not decisive. The significance of sustainability is particularly prominent among health-conscious and younger generations.

Trust in Organic Products

The majority of respondents (nearly 60%) generally trust the quality of organic products, but only 9.6% have complete trust in them. Labels and certifications, along with personal experiences, are the most important sources of information when selecting organic products, while advertisements play a negligible role.



Source: Own compilation

The results of the questionnaire survey highlight a growing interest in organic foods among Hungarian consumers, but price sensitivity and limited product availability hinder their broader adoption. However, the increasing demand for sustainability and healthy nutrition presents opportunities for market expansion, especially if prices are reduced and the range of available products is broadened.

Conclusions and Recommendations

Based on the research findings, organic farming in Hungary holds significant potential but faces numerous challenges for both farmers and consumers. The conclusions and recommendations outlined in the thesis are centered around the following key themes:

Advantages and Challenges of Organic Farming

One of the greatest advantages of organic farming is its focus on chemical-free production and sustainability. This approach not only preserves soil fertility in the long term but also enables the production of healthier food. However, significant challenges include higher labor demands, the difficulties of the transition period, and the alignment of production costs with consumer prices. Both the interviews and survey results highlighted that price sensitivity is one of the biggest barriers to the consumption of organic products.

Consumer Behavior and Market Dynamics

There is growing interest in organic products among Hungarian consumers, but high prices and limited variety remain significant obstacles. The research revealed that while most consumers value health consciousness and sustainability, price sensitivity often prevents them from purchasing organic products. Expanding the range of available products and strengthening direct producer-consumer relationships could have a positive impact on the market.

Recommendations

- **Pricing policies and subsidies:** Increasing government subsidies and introducing tax incentives could help reduce the prices of organic products. Additionally, supporting innovations aimed at lowering production costs is essential.
- **Consumer education:** Comprehensive awareness campaigns about the benefits of healthy and sustainable foods can encourage more informed consumer decisions. Campaigns targeting younger generations, in particular, should emphasize sustainability and the advantages of organic products.
- **Innovation and technology:** Innovations in organic farming, such as precision agriculture and natural pest control, can not only reduce environmental impacts but also enhance the efficiency of farms. However, implementing these technologies requires initial investments, which necessitate the involvement of state and EU funding.
- **Support for local markets:** Promoting farmers' markets and direct sales channels can improve the accessibility of organic products and strengthen consumer trust.

Conclusion

Organic farming and sustainable agriculture are gaining increasing importance in Hungary, but broader adoption requires price reductions, enhanced consumer awareness, and improved market conditions. Adopting circular economy practices could play a pivotal role in achieving the environmental and economic sustainability goals of organic farming. In the long term, organic farming can provide not only environmental but also economic benefits if it receives adequate support and innovation.

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