

FOOD SYSTEM APPROACH IN ROMANIA: CHALLENGES AND OPPORTUNITIES

Raluca I. BARBU, Diana E. DUMITRAȘ

University of Agronomic Sciences and Veterinary Medicine of Cluj-Napoca, 3-5 Calea Mănăştur,
Cluj-Napoca, Romania, E-mails: raluca-ioana.barbu@student.usamvcluj.ro,
dumitras@usamvcluj.ro.

Corresponding author: raluca-ioana.barbu@student.usamvcluj.ro

Abstract

This paper investigates the implementation of a food system approach in Romania, focusing on its potential to enhance the resilience and sustainability of the food system, particularly for small producers. Drawing on existing literature, the study identifies key actors and themes within the Romanian food system. The findings highlight the crucial role of collaborative partnerships—as emphasized in the EU's Food 2030 strategy—in achieving inclusive growth and building a resilient agricultural framework. The research concludes that aligning with European directives necessitates fostering partnerships and implementing systemic changes through well-funded research and inclusive strategies to overcome challenges faced by small producers and build a more robust and equitable food system in Romania. The study emphasizes the interconnectedness of food processes for security and sustainability, underscoring the need for a holistic approach to address the specific challenges faced by small-scale producers.

Key words: food production, food consumption, governance, small producers, sustainability

INTRODUCTION

The agri-food system is a complex and interconnected network essential for ensuring food security, sustainability, and economic stability. Currently, we face unprecedented challenges, including the climate crisis, conflicts like the recent war in Ukraine, resource scarcity, inequality, food insecurity, malnutrition, and environmental degradation - particularly impacting marginalized rural communities and the urban poor. After decades of decline, the global hunger rate, which reversed in 2015, has stagnated below 11 percent, leaving over 820 million people hungry in 2018 (FAO, 2018) [19]. Presently, more than 110 million people are experiencing food crises, and this situation is likely to worsen if current trends continue.

These challenges stem from three main drivers:

- **Socio-economic factors:** demographic changes, urbanization, increasing inequality, limited resource access, unhealthy eating habits, and poverty.

- **Environmental factors:** climate change, soil degradation, over-exploitation of natural resources, and water scarcity.

- **Peace and security issues:** armed conflict, governance challenges, and violations of fundamental rights.

The EU, through frameworks such as the European Green Deal, the Farm to Fork Strategy, and the Biodiversity Strategy, aims to address these complexities by shaping agricultural and food policies that align with global sustainability goals. However, the current EU food system, including Romania's, primarily focuses on short-term economic gains and food safety, often neglecting broader sustainability aspects. A necessary paradigm shift is required to move from a short-term "productivist view" to a long-term commitment to inclusive food security that does not harm the environment or undermine food systems elsewhere (Bock, A.K., Bontoux, L., Rudkin, J., 2022) [6].

This transition necessitates simultaneous changes across multiple areas of the food system, supported by integrated policies tailored to Romania's specific context. Urgent action is required due to the significant challenges posed by climate change and biodiversity loss, with a limited timeframe to avert irreversible damage. While voluntary measures may initiate change, binding rules are

essential for establishing ambitious goals and providing reliability.

Key actors within Romania's food system—such as primary producers, food and drink manufacturers, retailers, and financial entities must be empowered to promote sustainability alongside collective consumer actions. Transparency and accountability are critical, particularly in addressing sustainability impacts at both production and consumption levels. Thus, Romania should shift its focus from immediate economic growth to sustainable and equitable food security, aligning with broader EU objectives. To address these dynamics, the EU, in collaboration with the FAO, organized the High-Level Event “Food & Agriculture in Times of Crisis: Working Better Together for Long-Term Solutions” on April 1-2, 2019, emphasizing the urgent need for a sustainable food systems approach to tackle interconnected issues effectively.

Food production, while supporting many livelihoods, is also associated with numerous sustainability challenges: poverty affects the potential of food production by triggering high levels of agricultural employment; practices such as land clearing lead to the increase of greenhouse gas emissions and to loss of biodiversity; yields in already at-risk areas are reduced due to climate change; demand for nutritious food increases although malnutrition from unhealthy diets remains a global health concern (IPBES, 2019; Springmann et al., 2018; Swinburn et al., 2019; Willett et al., 2019) [33, 46, 47, 51]. The connection between food security, environmental sustainability, and social equity does not receive sufficient attention in addressing these challenges (IPCC, 2019) [35]. Tackling one issue may unintentionally exacerbate others, emphasizing the need for a balanced approach to managing sustainability trade-offs across the various dimensions of the food system (Béné et al., 2019) [3, 4].

A food systems approach (FSA) analyzes the interconnectedness of food-related components and their impacts on sustainability, resilience, and equity. This holistic perspective is increasingly recognized

as essential for addressing the multifaceted challenges facing global food systems.

This research explores the potential of adopting an FSA in Romania, focusing on implications for small-scale producers, who constitute a significant proportion of the country's agricultural sector. It aims to examine the current EU policy landscape regarding the adoption and implementation of FSA, review the existing literature on food system resilience and sustainability, and identify challenges and opportunities for adopting it at the national level. The study outlines the necessary steps for implementing a sustainable FSA in Romania, leveraging (points of interventions for maximizing the benefits) an analysis of the policy environment, the Romanian agri-food sector, and the transition from a productivity-centred model to a systems-oriented approach. Given the current limited information and research on Romania's agri-food system, this article seeks to clarify strategies to address these challenges while emphasising the absence of a clear definition and conceptualization of the FSA in the existing literature.

The research is structured around three key questions:

1. Why is adopting the FSA important?
2. What is the policy context for adopting an FSA?
3. What key aspects should be considered when implementing the “FSA” in Romania?

MATERIALS AND METHODS

To analyse the policy context for implementing the Food System (FS) approach and to understand how to identify key aspects for its application in Romania, this research employed a mixed-methods approach.

This approach included a comprehensive literature review, qualitative analysis of policy documents, secondary data analysis, and in-depth interviews.

Additionally, insights were gained from observations made during relevant workshops and conferences, further enhancing the depth of the findings.

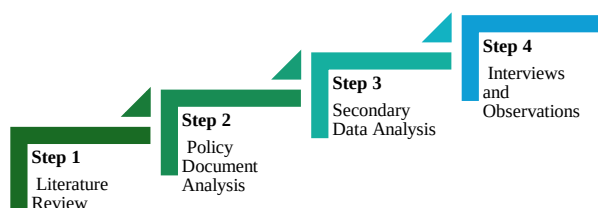


Fig. 1. Methodological steps for responding to the research questions

Source: Own design of the methodological steps.

These four methodological steps are described below, conducting the research.

Literature Review

A comprehensive literature review was undertaken, concentrating on key themes such as food systems, sustainability, resilience, governance, and the application of the FSA in diverse contexts. Databases such as Scopus, Web of Science, and Google Scholar were accessed to review both academic and grey literature. To address the research questions, search keywords included "food system approach", "food system sustainability," "food system transformation", "food system resilience", "smallholder farmers in the food system", and "agri-food system in Romania". From this search, 24 records were identified in Scopus and 27 in Web of Science and Google Scholar. After removing duplicates, 12 articles remained. Article titles, keywords, and abstracts were then screened to ensure they aligned with the research aims and met quality standards.

The exclusion criteria applied were as follows:

- articles that did not primarily focus on FS, even if terms such as "food system" or "governance" appeared in their abstracts. For example, studies focused on "nutrition", "water governance", or "data use in FS", rather than on FS themselves, were excluded.
- articles unrelated to the "transformation", "governance", or "EU policy context" dimensions were excluded. This included studies where key search terms appeared only in problem statements or conclusions, without serving as central points for discussions on "FS sustainability" or "FS governance". Examples of such topics include "nutritional resilience", "food policies", and "rural dynamics". As a

result of this rigorous selection process, a refined set of literature was identified, enabling a focused analysis aimed at understanding the nuances and intricacies of FS implementation in diverse settings, particularly within the Romanian context.

Policy Document Analysis

An in-depth analysis was conducted on essential policy documents relating to agriculture, food security, and rural development in Romania. For this purpose, a range of national strategic plans and relevant EU directives and studies were covered, including the F2F Strategy, the Common Agricultural Policy, the Food 2030 Pathways for Action, and the EU Food System Dashboard. The aim was to identify key policy goals, strategies, and support mechanisms that encourage the adoption of a sustainable FS. These documents were systematically reviewed to evaluate their implications for FS governance and its implementation. Each policy was examined for its alignment with overarching contributions to the SDGs, sustainability objectives, the integration of stakeholder interests, and its potential impact on fostering a resilient agricultural ecosystem. Furthermore, the review sought to uncover gaps and challenges within the existing policy framework, highlighting areas that may require further development or reform. Additionally, specific attention was given to the indicators available for the Romanian food system at the EU level, especially the ones on governance, as well as the inclusivity of smallholder farmers and local communities, analyzing how policies address their needs and contributions to the food system. The findings from this analysis aim to provide actionable insights for policymakers, stakeholders, and researchers, ultimately contributing to a more effective and equitable food system in Romania. By synthesizing these various elements, this research endeavours to offer a comprehensive understanding of the current policy landscape and its role in advancing FS sustainability and resilience.

Secondary Data Analysis

Data from authoritative sources, such as the Romanian National Institute of Statistics (INSSE) [31], the Ministry of Agriculture and

Rural Development (MADR) [36], and the Food and Agriculture Organization (FAO), were utilized. This data provided insights into the structure of the Romanian FS, the role of small-scale producers, and various socio-economic indicators relevant to the study.

Interviews and Observations

Qualitative interviews were conducted with key stakeholders, including policymakers, researchers, academics, and practitioners. Observations were also gathered from workshops and conferences, particularly those associated with research and innovation projects like FoodSHIFT2030, CleverFood, and the Food2030 Network.

To assure a comprehensive understanding, the following categories were considered for the data extraction and analysis of each article:

- Aim and objectives of the research presented in the articles.
- Summary of the results:
 - FS definitions
 - FS sustainability and resilience.
 - elements of the concept framework of the FS.
 - current challenges revealed in the agri-food system in Romania.
- Main conclusion.
- Proposals for further actions.

RESULTS AND DISCUSSIONS

Why is adopting the FSA important?

A sustainable FS is “a food system that delivers food security and nutrition for all in such a way that the economic, social, and environmental bases to generate food security and nutrition for future generations are not compromised” (HLPE, 2014) [28].

Analysing food systems (FS) at a territorial level enables the creation of policies. It is expected that such policies to enhance economic efficiency, foster social cohesion, and reduce environmental impact.

According to FAO (2018), a comprehensive FSA contributes to:

- (i)boosting productivity while safeguarding the environment,
- (ii)elevating the added value of territories and promoting short food supply chains,
- (iii)increasing local product consumption while enhancing urban-rural interactions (FAO, 2018) [18].

The definition refers to all aspects and elements that contribute to the flow of products from farm to table, namely the environment, people, inputs, processes, infrastructure, and institutions (IFPRI, 2016) [32]. FS plays a crucial role in shaping diets by determining which foods are produced, their physical and economic accessibility, and influencing food preferences. The components of FS include food supply chains, food environments, and individual factors.

FS also encompasses crosscutting issues and drivers (factors that push or pull at the system, some being exogenous to FS) (Figure 2).

The components, crosscutting issues, and drivers all shape FS and can lead to both positive and negative outcomes. The reviewed literature reveals a spectrum of findings, ranging from food to more than just nutrition; it is a vital component of societal stability. Traditional practices such as gathering, hunting, fishing, and agriculture have historically supported rural livelihoods (Frison, E.A. & IPES-Food, 2016) [22]. As urbanization progresses, these activities—along with food processing and marketing—have become essential sources of income. Food not only meets biological needs but also fosters social interaction through shared meals, serves as a creative outlet in cooking, and reflects personal identity. It connects individuals to their environment, as food production shapes landscapes and engages with nature.

Regardless of food security, societies prioritize the origins and quality of their food, underscoring its importance for well-being and community cohesion.

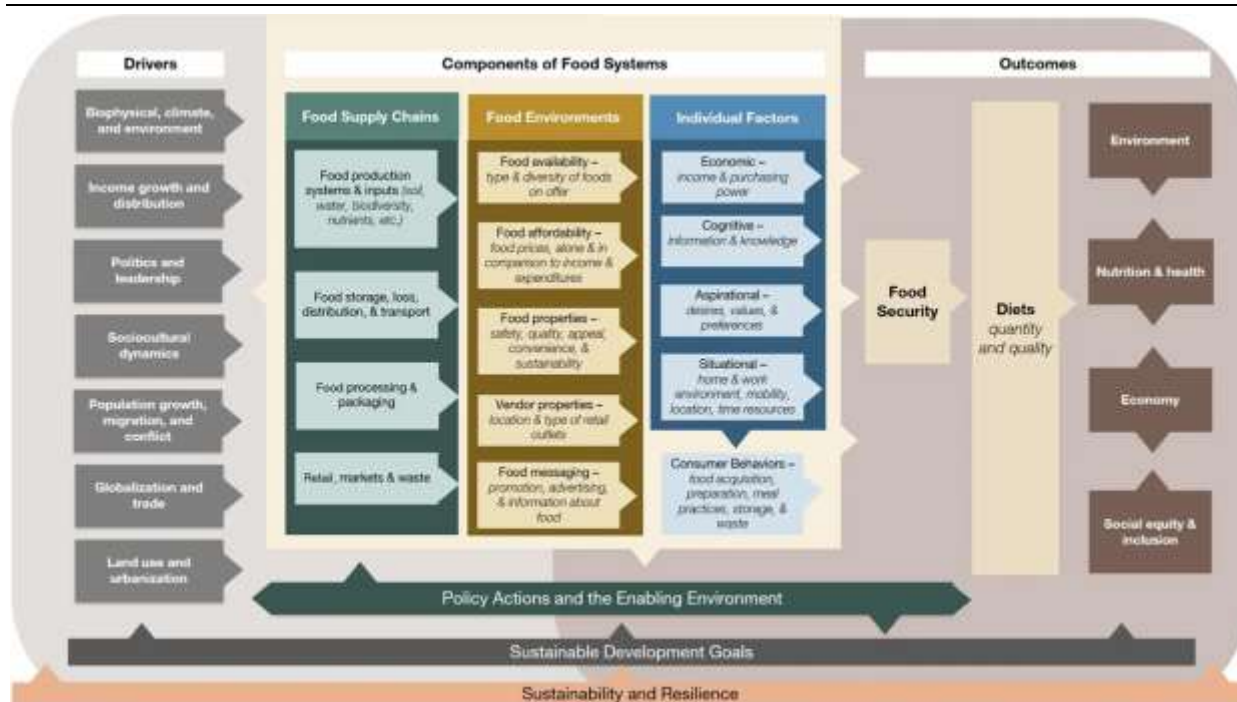


Fig. 2. Food System Framework.
Source: FSCI, 2023 [48].

Food security, food systems, and food resilience are interconnected but distinct concepts, each with its own intellectual and policy background (Barrett, 2024) [2].

Food security is considered a "wicked problem," characterized by paradoxes like the existence of both high rates of stunting and obesity, as well as persistent child malnutrition despite functioning FS. This complexity leads to challenging policy decisions, such as balancing food prices for producers versus consumers and determining whether to focus on maximizing agricultural yields or minimizing yield volatility, particularly in the context of climate change

Food systems encompass a broader range of actors, often highlighting food producers and consumers while neglecting processors, distributors, and urban FS. The COVID-19 pandemic underscored the vulnerabilities in food processing and highlighted the precarious access to food faced by urban poor populations, indicating a need for more comprehensive analysis across various components and demographics.

Food resilience involves robust producers, processors, distributors, and consumers who can adapt to shocks and stressors. It emphasizes continual adjustment rather than maintaining the status quo, requiring innovation and political commitment. While global FS have shown

resilience with advancements in agriculture and institutional support, progress toward zero hunger is uneven, and concerns persist regarding access to nutritious and affordable diets.

Overall, despite the improvements in FS, the fragmented understanding of food security and resilience underscores the necessity for a balanced approach that addresses both food production and equitable access.

Food Systems Approach (FSA): a holistic view

FS has evolved from traditional household practices to specialized commercial operations, enhancing product quality for long-term storage and transport, and thereby improving food accessibility in urban areas. As urbanization rises, these culturally rooted activities are crucial for job and income generation. The food sector employs over 2 billion people globally, making it the largest employment sector; agriculture composed 68% and 39% of employment in low-income and lower-middle-income countries in 2016 (ILOSTAT, 2019) [30]. The focus on post-harvest processes has expanded to comprehensive FS, which include transportation, processing, waste management, and regulation (adapted from Pothukuchi and Kaufman, 2000; FAO, 2018) [42,19]. Viewing these systems as interconnected sub-systems provides insights into their interactions and impacts, supporting a

bioeconomy that produces food, energy, and raw materials, where changes in one part affect the whole system.

Food Systems: transformation and inclusive development

Transforming food systems is crucial for a sustainable future, contributing to poverty reduction, improved health, economic growth, and supporting the Sustainable Development Goals (SDGs). This transformation can eradicate hunger, enhance nutrition, ensure food security, reduce greenhouse gas emissions, and promote environmental protection (Benton et al., 2021) [5].

With approximately 1.23 billion people employed in FS and 3.83 billion linked to food-based livelihoods, this transformation holds significant potential for job creation and poverty alleviation, especially in rural areas. By adopting innovative practices, we can enhance farmers' productivity and income, which is vital for addressing rural poverty and mitigating climate change while aiming to keep global warming below 1.5 degrees Celsius. Economically, transforming FS could yield benefits of "USD 5 to 10 trillion"

annually, representing 4 to 8 percent of global GDP in 2020 (FAO, 2011) [17]. Aligning investments across agriculture, health, and environmental conservation helps tackle interconnected challenges like hunger and malnutrition while maximizing impacts and advancing the SDGs.

Despite sufficient global food production, access remains limited due to barriers in production capacity and affordability. The commercialization of post-harvest activities is altering income distribution, particularly impacting gender equity (Enete, Nweke, and Tollens, 2004; Harriss-White, 2005) [13, 26]. Access to land and resources is crucial, as inequalities are exacerbated by industrialization. Traditional food knowledge remains essential for preserving diversity and culture. FS also significantly impacts environmental sustainability, affecting landscapes, biodiversity, and energy use. Adopting alternative production methods can enhance sustainability through recycling and carbon capture (Frison and IPES-Food, 2016; Mason and Lang, 2017) [22, 37].



Fig. 3. Food-system-conceptualisation

Source: Adapted after Ericksen, P. J. (2008) [14].

Small farmers are key to local food production and rural economies in developing countries (FAO, 2014) [18] and provide insights into sustainable practices. Understanding their challenges, such as limited resource access, is

vital for promoting inclusivity and social equity (Reardon et al., 2019) [43]. Their roles in building resilience to climate change through adaptive strategies inform policies that enhance agricultural practices (Dercon and

Gollin, 2014) [10]. FS comprises interconnected actors and activities that produce various outcomes, including food and nutrition security (Ericksen, 2008a) [14].

The effectiveness of small farms largely depends on their market connections, which enable the efficient distribution of surplus (HLPE, 2013) [27]. By assessing these contributions, we can better understand their role in local food security and the broader FS (Figure 3).

Food system at risk

According to the Food and Agriculture Organization (FAO) in 2014 [18], rapid population growth, urbanization, rising wealth, and changing consumption patterns are straining FS' ability to sustainably provide nutritious food and support livelihoods. FS both contribute to and suffer from climate change, land degradation, and biodiversity loss. The joint FAO, CIRAD, and EC report, "Food Systems at Risk: New Trends and Challenges" (Dury et al., 2019) [12], outlines several reasons for adopting a sustainable FSA:

1. **Climate impact:** strong evidence links food production, transport, and marketing to climate change, with increased animal product consumption contributing significantly to deforestation (Swinburn et al., 2019) [47].

2. **Health concerns:** current FS are associated with rising obesity and non-communicable diseases, indicating a need for systems that promote better health outcomes.

3. **Cumulative risks:** the complexity and interconnections of FS complicate risk prediction and impact measurement, necessitating a systematic management approach.

4. **Interconnected drivers:** the interaction among economic, environmental, and demographic factors highlights the need for a framework to address these interdependencies.

5. **Inequality and inclusion:** trends within FS threaten the inclusion of marginalized groups, such as women and minorities. A sustainable approach aims to promote equity.

6. **Environmental degradation:** existing FS led to resource over-exploitation, biodiversity loss, and pollution. A sustainable approach can mitigate these environmental impacts.

7. **Economic viability:** sustainable FS can create jobs and support prosperity in low- and middle-income countries, while neglecting these trends risks economic stability.

8. **Food and nutrition security:** achieving food security relies on addressing environmental and social/economic outcomes and ensuring stable markets and healthy diets. The urgency for a sustainable FSA has intensified due to recent crises, such as the war at Romania's border and the COVID-19 pandemic, worsening food insecurity. This approach addresses health and environmental challenges by acknowledging the interconnectedness of agriculture, processing, distribution, retail, and consumption. For low and middle-income countries, this approach is crucial as the increase in food production was not sufficient to eradicate hunger.

The emphasis on rural-urban linkages and food supply chains has prompted the development of a framework for analyzing trade-offs among nutrition, environmental sustainability, and equity. Aligning health, environmental, and equity objectives with context-specific solutions is essential. Although FS frameworks receive more attention, their practical applications and the level of stakeholder engagement remain largely unexplored.

A FSA differentiates between the drivers and outcomes of transformation, identifying strategic leverage points for policy innovations (HLPE, 2017) [29]. The leverage points are specific areas in a system where small and strategic changes may result in significant impacts (Meadows, 1999) [39]. Good communication among stakeholders can facilitate the identification of the leverage points. In the same way, understanding the dynamics between formal and informal arrangements can facilitate adaptive change and, also, promote social progress (Geels, 2002) [24]. Changes in one area, for example, energy policies, can profoundly impact the entire FS, which *encompasses all actors and activities related to food production, processing, distribution, consumption, and disposal, influenced by broader economic, social, and natural contexts*.

It is essential to identify the diverse pathways for FS transformation and to highlight their

practical implications for policymakers. For effective governance of FS transformation processes, a well-structured and consistent analytical framework is necessary. Such a framework will provide insights into stakeholder interests, interactions, and their behavioral responses to incentives, innovations, and uncertainties. This understanding is crucial for adding value to different stakeholders and ensuring their active involvement in transformative FS processes.

A **sustainable and resilient FS** ensures food security and nutrition without compromising the economic, social, and environmental resources needed for future generations. This involves being economically viable, socially beneficial, and environmentally positive or neutral. Since 2015, when the United Nations' Sustainable Development Goals (SDGs) were set, sustainable FS has become a central element of SDGs, aiming to end hunger, secure food, and improve nutrition by 2030. Achieving the SDGs requires transforming global FS to be more productive, inclusive of marginalized groups, environmentally sustainable, resilient, and capable of providing healthy diets. This necessitates coordinated actions at local, national, regional, and global levels to tackle these complex and systemic challenges. A FS requires a comprehensive view that encompasses rapid demographic changes, urbanization, wealth increase, shifting consumption patterns, globalization, climate change, and resource depletion (Nguyen, H., 2018) [40]. Recent developments in FS, notably in developing countries, have boosted employment and food diversity, catering to consumer preferences. However, these changes bring challenges such as the prevalence of highly processed foods, unequal market access for small producers, and increased environmental impacts. Addressing these issues mandates a holistic and coordinated approach that transcends traditional sectoral boundaries. Currently, the systems often focus narrowly on food production, overlooking the wider interactions and feedback loops that impact food security and nutrition. Approaches like value chain and market systems development provide systemic perspectives but can still be limited by narrow

focuses. Therefore, a FSA is expected to consider the entire system, its interactions, and broader impacts to foster systemic transformations. This encourages **multi-stakeholder collaboration**, and Policy coordination is essential for identifying synergies across key FS priorities, such as poverty reduction, productivity, nutrition, and sustainability, while effectively managing trade-offs to maximize positive outcomes. Although trade-offs among these priorities are inevitable, this approach promotes the alignment of efforts to achieve multiple goals simultaneously.

Research on **FS sustainability and resilience** underscores the importance of biodiversity, climate change mitigation, resource efficiency, and social equity. While global studies have explored these aspects, targeted research specific to Romania remains limited. Existing literature highlights the vulnerability of Romanian agriculture to climate change, alongside challenges related to water resources, soil degradation, and market access for small producers. Much of the available research focuses on resilience at the farm level rather than addressing systemic FS resilience.

What is the policy context for adopting a FSA?

Food system sustainability in the global and EU political agenda

A sustainable FS is “*a food system that delivers food security and nutrition for all in such a way that the economic, social, and environmental bases to generate food security and nutrition for future generations are not compromised*” (FAO, 2018) [19]. Economic sustainability covers profitability and affordability throughout the system. Social sustainability means wide-scale benefits including health, cultural drivers, and just and fair outcomes (SAPEA, 2020) [44]. Environmental sustainability means FS that have a neutral or positive environmental climate and biodiversity footprint (EC, 2020) [15]. In other words, FS are expected to contribute to SDGs established by the international community in 2015, and to do so, they must operate within planetary boundaries. A systems-based approach is crucial for effectively tackling these challenges, allowing for a holistic

consideration of the complexities involved in achieving sustainability (FAO, 2014) [18]. While FS have traditionally focused on increasing production, often leading to social inequalities and environmental degradation, they have the potential to significantly contribute to 14 out of the 17 SDGs (Caron et al., 2018; FAO, 2017, 2018b) [9, 20, 19] (see

Figure 4). These contributions can be grouped into three main objectives: (a) ensuring food security and improved nutrition, (b) fostering inclusive development, and (c) promoting a sustainable environment and combating climate change. These goals are interconnected, as food and nutritional security cannot be attained without addressing poverty and environmental degradation.

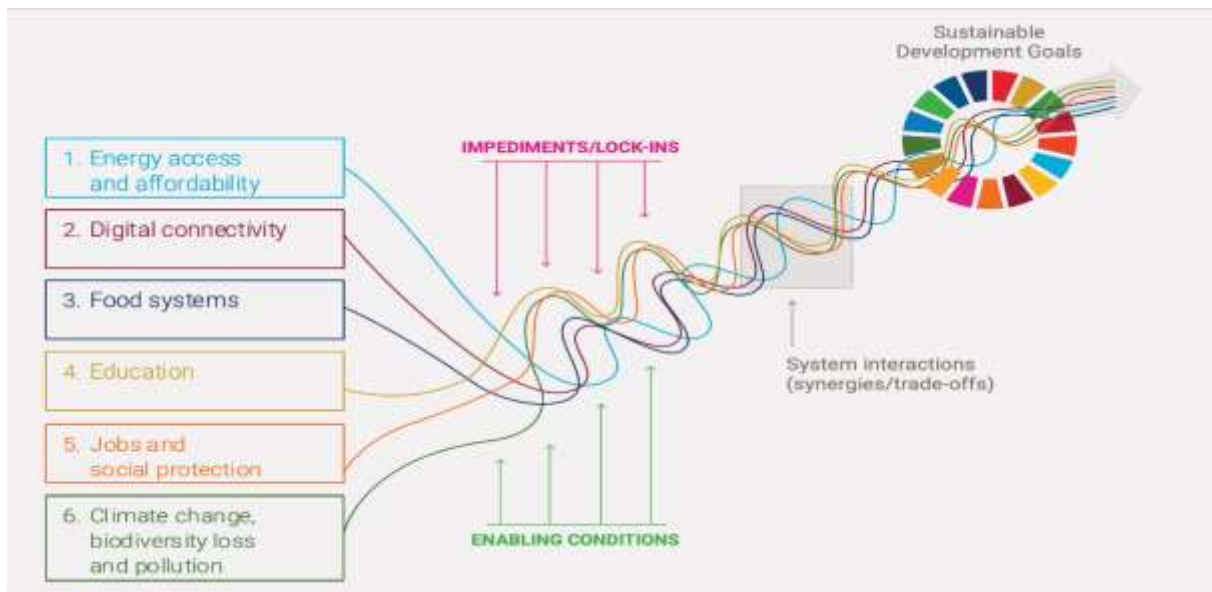


Fig. 4. The six key transitions that can have catalytic and multiplier effects across the SDGs
Source: Adapted by a Group of scientists appointed by the Secretary General, 2023.

FS have also been shown to significantly contribute to environmental degradation and exacerbate social and economic inequalities (Garnett, 2011; Foley et al., 2011 [23,21]; McKeon, 2015; UNEP, 2016) [38, 49]. The urgent need for systemic change toward more sustainable FS is widely recognized (IPES-Food, 2015; Milan Expo, 2015; Brunori et al., 2017; Gordon et al., 2017) [34, 8, 25] as reflected in global initiatives such as the SDGs and the Paris Agreement. These initiatives highlight the complex interrelationships between FS and critical issues such as malnutrition, obesity, climate change, poverty, biodiversity loss, and social injustice (Development Initiatives, 2017; Abarca-Gómez et al., 2017) [11, 1].

The EU FS is designed to align and contribute to commitments established under global initiatives, including the SDGs, the United Nations Framework Convention on Climate Change (UNFCCC), and the Global

Biodiversity Framework (Borchardt et al., 2024) [7].

Therefore, the **European Green Deal (EGD)** aims to achieve climate neutrality and resource efficiency within the EU while also promoting economic growth and respecting planetary boundaries.

To achieve this vision, it requires fundamental changes across key economic sectors, particularly in the FS. The EGD introduces a new and inclusive growth strategy that highlights the importance of a comprehensive, cross-sectoral approach that integrates considerations for climate, environment, agriculture and forestry, fisheries and aquaculture, energy, transport, industry, and sustainable finance (European Commission, 2020, Green Deal) [15]. Central to the EGD is the Farm-to-Fork (F2F) Strategy, which thoroughly addresses the challenges of creating a sustainable FS while acknowledging the vital connections between healthy individuals, thriving societies, and a healthy planet

(COM(2020) 381 final). While food produced within the EU and imported into it already adheres to the highest standards of food safety and security, the current challenge is to expedite the transition toward sustainability, ensuring that planetary boundaries and societal well-being are upheld.

In the EU context, once the priority of food safety is effectively ensured, initiatives and interventions aimed at enhancing the sustainability of the FS should focus on the environmental, economic, and social dimensions, aligned with common policies across all EU Member States. Key policies, including the **Common Agricultural Policy** (CAP), the Common Fisheries Policy (CFP), the Zero Pollution Action Plan (ZPAP), the Circular Economy Action Plan (CEAP), the proposed Nature Restoration Law, and the Biodiversity Strategy, contain provisions that support the sustainability of the EU FS in both the short and medium term. Moreover, the EU committed to leveraging resources such as **Horizon Europe and the European Agricultural Fund for Rural Development** (EAFRD) to support research and innovation in the fields of sustainable agriculture, climate adaptation, and biodiversity conservation.

To achieve sustainable FS, the European Commission has launched the Research and Innovation (R&I) initiative through Horizon Europe, establishing the **Partnership for Sustainable Food Systems (P-SFS) for People, Planet, and Climate** (SCAR-FS) [45]. This initiative outlines a framework for contributing to EU policies and international efforts by addressing four key **thematic R&I areas** essential for developing sustainable food systems in the EU (Figure 5):

-R&I 1 ‘Change the way we eat’

-R&I 2 ‘Change the way we process and supply food’

-R&I 3 ‘Change the way we connect with food systems’

-R&I 4 ‘Change the way we govern food systems’.

The guiding document emphasizes the urgent need for member states to form partnerships to enhance governance for sustainable FS. It calls for a shift from a fragmented approach to address challenges related to climate, sustainability, health, and livelihoods (EC, 2020) [15]. Governance, defined as the processes by which society confronts its issues, is influenced by the interactions among various actors with differing, often conflicting, goals and interests. Research and innovation (R&I) areas aim to deepen understanding of governance patterns and provide practical solutions for achieving sustainability. Key governance challenges include fragmentation, slow adaptation, and difficulties in prioritizing urgent FS issues (EC, 2020) [18].

In December 2023, the “New Report: Food 2030 Research and Innovation – Pathways for Action 2.0” was released by the EC to guide future R&I policies related to Horizon Europe, the Farm to Fork (F2F) Strategy, the European Green Deal, and implementation of the FSA. It outlines eleven action pathways for R&I to deliver co-benefits in nutrition, climate, circularity, and community well-being:

1. Governance for Food Systems Change.
2. Urban Food Systems Transformation.
3. Food from Ocean and Freshwater Resources.
4. Alternative Proteins for Dietary Shifts.
5. Food Waste and Resource-efficient Systems.
6. The Microbiome World.
7. Nutrition and Sustainable Diets.
8. Advanced Food Safety Systems.
9. Food Systems Africa.
10. Data & Digital Transformation.
11. Zero Pollution Food Systems.

The report emphasizes the importance of a systemic, interdisciplinary approach to R&I for improved impact.

Enable R&I to drive food systems transformation processes



Fig. 5. The four R&I Areas and four Activity Areas of the Partnership SFS, all interconnected.
Source: SCAR-FS [45].

The **Food Systems Countdown Initiative (FSCI)** [48] monitors the global performance of FS toward achieving the 2030 Sustainable Development Goals (SDGs) through over 100 key indicators. Addressing challenges like food insecurity and environmental degradation, the initiative advocates for comprehensive assessments to guide necessary transformations. The primary objective of FSCI is to provide policymakers with evidence to foster sustainable, equitable, and resilient FS. To achieve this, the EC has developed the **Food System Dashboard**, a comprehensive monitoring framework for the EU FS's sustainability, which spans the entire food supply chain, from pre-production to disposal. This dashboard includes over 230 indicators across environmental, economic, and social dimensions, with a focus on quality assessment and normalized comparability. It enables users to interact with data on different sustainability aspects and will continually evolve to address data gaps and new policy priorities.

The FSCI data for Romania presents a mixed picture of FS indicators, revealing both strengths and significant weaknesses. Based on own interpretation and analysis of the main indicators for Romania, the situation is as follows:

1. Diets, Nutrition, and Health

-Unaffordability of Healthy Diets: a concerning 60% of the population is unable to afford a healthy diet, indicating widespread food insecurity.

-Suboptimal Fruit and Vegetable Consumption: fruits (293.8 g/capita/day) and vegetables (424.6

g/capita/day) are available; however, there is no data on whether actual consumption meets recommended levels, necessitating further investigation.

-Inadequate Access to Safe Drinking Water: only 67% of the population uses safely managed drinking water services, underscoring a need for improved sanitation infrastructure.

-High Consumption of Ultra-Processed Foods: the retail value of ultra-processed foods is relatively high at 183.4 current PPP dollars per capita per year, indicating a dietary shift that requires attention.

-Missing Data on Dietary Diversity: the absence of data on minimum dietary diversity for women and the overall consumption of all five food groups prevents a thorough assessment of dietary quality.

2. Environment, Natural Resources, and Production

-Moderate Nitrogen Use Efficiency: scoring 68%, this figure suggests room for improvement in sustainable agricultural practices.

-Low Crop Yields: yields for cereals (0.4 tonnes/ha), fruits (0.8 tonnes/ha), and vegetables (1.4 tonnes/ha) are low compared to their potential, requiring further analysis to determine underlying causes.

-High Greenhouse Gas Emissions: Significant emissions are observed across various agricultural sectors, indicating a critical need for strategies to mitigate climate change impacts.

3. Livelihoods, Poverty, and Equity

-Low Agricultural Contribution to GDP: agriculture accounts for only 4% of GDP. While diversification may be beneficial, this low figure

suggests challenges for the agricultural sector and rural communities.

-High Rural Unemployment: the unemployment rate in rural areas stands at 9%, which is a concern.

-Social Protection Coverage: a relatively high 81% of the population has social protection coverage. However, the adequacy of this protection is questionable, as only 54% of beneficiaries experience sufficient welfare.

4. Governance

-Low Government Effectiveness: there is currently no measure of governance effectiveness related to FS, and no data exist for a national FS transformation pathway.

-Limited Governance Data: the absence of data on various governance indicators, including civil society participation, hampers a comprehensive evaluation of governance in the FS.

5. Resilience

-Limited Data Availability: A significant number of resilience indicators lack data, preventing a complete analysis of the FS's capacity to withstand shocks.

According to the monitoring data, and compared with the Eastern European levels, Romania's FS faces substantial challenges, particularly in areas of diet affordability and quality, environmental sustainability, and the economic well-being of rural populations.

While positives such as social protection coverage exist, comprehensive improvements are crucial across various sectors.

The lack of data for numerous indicators highlights the urgent need for improved data collection and monitoring to facilitate informed policymaking and strategic interventions.

Engaging experts in food security, agriculture, and public health is recommended for a deeper understanding and the development of effective strategies to enhance Romania's FS.

What key aspects should be considered when implementing the "FSA" in Romania?

Beforehand, it is important to understand the characteristics of the Romanian agri-food sector. Based on an analysis of data available from national statistics (INSSE) [31], (Eurostat) [16], and the information collected in the SWOT analysis for Romania's National Strategic Plan for Agriculture (NSP-2021-

2027) [41], several key insights regarding the structure of the sector have emerged:

-The Romanian agricultural landscape is characterized by a high number of small farms, primarily those under 5 hectares, which tend to focus on subsistence farming rather than market-oriented production.

-This situation has resulted in significant polarization within the sector, creating a considerable gap in size and economic performance between small farms and larger commercial operations.

-Other key findings include:

(a)Farm Size Distribution: a large proportion of farms are small, with less than 2 hectares (2,480,770 holdings, 72% of the total), collectively utilizing only 1.53 million hectares (12.24% of the total utilized agricultural area - SAU) [50]. Farms with less than 5 hectares make up 91.8% of all holdings, but account for just 28.7% of SAU. In contrast, larger farms (>100 hectares) represent only 0.36% of total holdings and utilize 48% of SAU. The average size of smaller farms is merely 2.34 hectares, compared to the average size of 2,024.79 hectares for farms larger than 1,000 hectares. All these numbers indicate significant disparities in farm sizes.

(b)Economic Polarization: many farms exhibit low economic output. About 94.57% earn less than 8,000 euros in standard output (SO), below the EU average, indicating potential inefficiencies within the sector. Also, the agricultural income per worker is significantly lower than compared of other sectors.

(c)Land Use: arable land has the largest share of agricultural land use in Romania (63.47%), followed by pastures and hayfields (33.44%) and permanent crops (2.34%). The total SAU decreased in 2016 to 12.502 million hectares as compared to 2010 when where 12.502 million hectares. The changes indicate shifts in land use patterns or agricultural practices.

(d)Challenges for small farms: small farms face numerous obstacles, including limited access to markets, technology, finance, and information, as well as vulnerability to climate change impacts. Over half (50.02%) of the total SAU is affected by unfavourable environmental conditions due to biophysical factors, with mountainous regions (15.09% of

SAU) and significantly constrained areas (33.56%) impacting productivity.

(e)*Consolidation trends*: despite various schemes aimed at supporting small farms, there is evidence of land consolidation and a reduction in the number of farms, which dropped by 11.3% from 2010 to 2016, with the total requested area for surface payments growing from 9,177,354 hectares in 2016 to 9,748,666 hectares in 2019. This indicates a shift toward larger, more economically viable operations. The fragmented structure of small

farms, characterized by *low economic performance*, hinders the competitiveness of the Romanian agri-food sector. While there are signs of consolidation, significant challenges persist regarding profitability, resource efficiency, and modernization of practices. The data underscores the *urgent need for effective policies to address these issues and enhance the sector's overall performance*, while the *lack of available data on several key indicators* remains a notable concern.

Table 1. Challenges and Opportunities for adopting the food system approach in Romania

Challenges:	Opportunities:
1. Fragmentation of Agricultural Holdings: a significant proportion of Romanian farms (72% are under 2 hectares) leads to low economies of scale, reducing their competitiveness and limiting access to market opportunities, finance, and technology, exacerbates existing inefficiencies in production and distribution. 2. Economic Polarization: most small farms exhibit low economic output, with 94.57% earning less than 8,000 euros in standard output—far below the EU average. This economic disparity hampers the ability of smallholders to invest in modern practices and technologies, perpetuating a cycle of low productivity. 3. Vulnerability to Environmental Factors: over half (50.02%) of the utilized agricultural area is affected by unfavourable environmental conditions, complicating agricultural practices and reducing yields. The impact of climate change represents an additional vulnerability, with increasing extreme weather events further threatening agricultural productivity. 4. Aging Agricultural Workforce: the aging demographic of the workforce contributes to a shortage of skilled labor and presents challenges in attracting younger generations to the sector, hindering innovation and adaptability. 5. Limited Access to Resources: small farms face significant barriers in accessing markets, finance, and technological advancements. The lack of investment in infrastructure and support services limits their growth potential and sustainability. 6. Data Gaps: the absence of comprehensive data on various indicators, including dietary diversity and governance effectiveness, inhibits informed policymaking and strategic planning. 7. Poor Infrastructure - inadequate infrastructure, including roads, irrigation systems, and storage facilities, limits efficiency and market access. Low innovation and technology adoption foster reliance on traditional farming methods, while weak farmer organization reduces bargaining power and minimizes value addition from agricultural outputs. 8. An Inefficient Food Supply Chain restricts profitability and raises consumer prices, alongside significant food waste occurring at various points in the supply chain.	1. Rural Development Potential: with 207,633 km² of rural land and a rural population of 8,959,096, Romania has significant potential for rural development initiatives that support sustainable practices and enhance local economies. 2. Support from EU Policies: access to EU funding programs aimed at rural development, innovation, and technology adoption provides an opportunity to bolster the agricultural sector and improve productivity. 3. Consolidation Trends: evidence of land consolidation suggests a shift toward larger, more economically viable farms, which can enhance operational efficiency and competitiveness. Strategic policies that support this transition could foster sustainable growth. 4. Investment in Modern Agricultural Practices: investment in modern agricultural techniques, such as precision farming and digital technologies, which can help bridge the gap between small and large farms, increasing production efficiency. 5. Growing Consumer Demand: rising demand for high-quality, locally produced food presents an opportunity to promote short food supply chains and regional specialties, enhancing market access and profitability for smallholders. 6. Promotion of Sustainable Practices: increasing interest in sustainable and environmentally friendly agricultural practices allows Romania to align its agricultural policies with EU standards, potentially promoting organic and eco-friendly products that attract consumer interest. 7. Development of Cooperative Structures: enhanced cooperation among farmers through cooperative models can improve market access and bargaining power, enabling smallholders to compete more effectively. 8. Attracting Young People to farming and advancing digital technologies will address workforce challenges and improve agricultural efficiency. Evidence of land consolidation suggests a shift toward larger operations that, with strategic policy support, can enhance productivity and competitiveness.

Source: Own contribution based on INSSE and Eurostat data analysis [31, 16].

With a **rural area of 207,633 km² (87.09% of total land)** and a **rural population of**

8,959,096 (46.14% of total), Romania has significant rural development potential, emphasizing the *need for strategic initiatives to leverage agricultural resources and address urban-rural disparities*.

Based on the FS framework, monitoring indicators for Romania (EU FS dashboard), and the analyzed data regarding the Romanian agri-food sector, the main challenges and opportunities for implementing a FSA in Romania are shown in Table 1.

As illustrated by both the FSCI indicators for Romania and the analysis of the statistical data, Romania's agri-food sector faces considerable challenges, such as dietary affordability and quality, environmental sustainability, and the economic well-being of rural populations.

It equally offers numerous opportunities for transformation.

A FSA that harnesses the development potential of rural areas, supports small farmers, and promotes sustainable practices, enhanced by data collection, could pave the way for a more resilient and competitive agricultural sector.

Engaging stakeholders across agriculture, public health, and food security will be crucial for developing effective strategies to facilitate this transition.

CONCLUSIONS

To develop effectively sustainable FS in Romania and fulfil its commitments and obligations under the EU's Farm to Fork Strategy and the Food2030, several key priorities must be addressed.

These should concentrate on enhancing governance, sustainability and resilience within the Romanian agri-food sector:

1.Strengthening Governance and Policy Frameworks

- establish a national FS transformation pathway with specific targets, timelines, and responsibilities.
- enhance inter-institutional coordination by fostering collaboration among government bodies, local authorities, and stakeholders.
- improve data collection and monitoring through investments in infrastructure to support informed policymaking.

2. Promoting Sustainable Agricultural Practices

- incentivize sustainable farming techniques, such as agroecology and organic farming.
- facilitate access to modern agricultural technologies for small farmers.
- increase research and development focused on sustainability and climate resilience.

3.Fostering Economic Viability of Agriculture

- enhance access to finance with tailored instruments for small farmers.
- support the formation of cooperatives to improve market access and bargaining power.
- promote diversification of crops and value-added products.

4. Improving Food Security and Nutrition

- implement programs to ensure access to healthy, affordable food for vulnerable populations.
- encourage the development of short supply chains connecting local producers to consumers.
- invest in public education campaigns promoting healthy dietary practices.

5. Enhancing Environmental Sustainability

- develop strategies to reduce greenhouse gas emissions from agriculture.
- promote policies for conserving biodiversity and protecting natural resources.
- provide resources and training for farmers to adapt to climate change.

6.Engaging Stakeholders and Raising Awareness

- ensure active participation of all stakeholders in policymaking processes.
- foster public-private partnerships for innovation and sharing best practices.
- implement educational programs to raise awareness of sustainability issues in FS.

Beyond aligning with EU standards, Romania should focus on enhancing the resilience of its FS while ensuring the right to food for all social groups.

This comprehensive approach prioritizes effective governance, promotes sustainable practices, and fosters collaboration among stakeholders, enabling Romania to strengthen food security and cultivate resilient rural economies while addressing climate change and globalization challenges.

ACKNOWLEDGEMENTS

This research work was carried out with the support of coordinators of the following EU projects: FoodSHIFT 2030, VISIONARY, and CleverFood.

REFERENCES

- [1]Abarca-Gómez, L., Abdeen, Z. A., Hamid, Z. A., Rmeileh, N. M. A., Cazares, C. A., Acuin, C., Adams, R. J., 2017, Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: A pooled analysis of 2416 population-based measurement studies in 128.9 million children, adolescents, and adults. *The Lancet*, 390, 2627–2642.
- [2]Barrett, C. B. (Ed.), 2024, *Resilience and Food Security in a Food Systems Context*. Palgrave Studies in Agricultural Economics and Food Policy. Cornell University, Ithaca, NY, USA.
- [3]Béné, C., Oosterveer, P., Lamotte, L., Brouwer, I. D., Haan, S. D., Prager, S. D., Talsma, E. F., Khoury, C. K., 2019, When food systems meet sustainability – Current narratives and implications for actions, *World Development*, 113, 116–130, <https://doi.org/10.1016/j.worlddev.2018.08.011>.
- [4]Béné, C., Prager, S. D., Achicanoy, H. A. E., Toro, P. A., Lamotte, L., Cedrez, C. B., Mapes, B. R., 2019, Understanding food systems drivers: A critical review of the literature. *Global Food Security*, 23(April), 149-159. <https://doi.org/10.1016/j.gfs.2019.04.009>.
- [5]Benton, T.G., Bieg, C., Harwatt, H., Pudasaini, R., Wellesley, I., 2021, *Food system impacts on biodiversity loss - Three levers for food system transformation in support of nature*. London: Chatham House.
- [6]Bock, A.K., Bontoux, L., Rudkin, J., 2022, *Concepts for a sustainable EU food system*, EUR 30894 EN, Publications Office of the European Union, Luxembourg; doi:10.2760/381319, JRC126575.
- [7]Borchardt, S., Barbero Vignola, G., Listorti, G., Fronza, V., Guerrieri, V., Acs, S., Buscaglia, D., Maroni, M. and Marelli, L., 2024, *Cultivating sustainability: the role of European Food Systems in advancing the SDGs*, European Commission, Joint Research Centre, Publications Office of the EU, Luxembourg, JRC137661.
- [8]Brunori G., Schmitt E., F. Galli, D. Menozzi, D. Maye, JM. Touzard, A. Marescotti, J. Six, 2017, Comparing the sustainability of local and global food products in Europe, Volume 165, *Journal of Cleaner Production*, 346-359.
- [9]Caron, P., Ferrero y de Loma-Osorio, G., Nabarro, D. et al. 2018, *Food systems for sustainable development: proposals for a profound four-part transformation*. *Agron. Sustain. Dev.* 38, 41, <https://doi.org/10.1007/s13593-018-0519-1>
- [10]Dercon, S., Gollin, D., 2014, *Agriculture in the global economy: The role of smallholder farms*. The State of Agricultural Commodity Markets 2018.
- [11]Development Initiatives, 2017, UN, Department of Economic and Social Affairs, Sustainable Development, <https://sdgs.un.org/goals>
- [12]Dury, S., Bendjebbar, P., Hainzelin, E., Giordano, T., Bricas, N., 2019, *Food Systems at risk: new trends and challenges*. FAO, CIRAD, and European Commission.
- [13]Enete, A.A., F.I. Nweke, and E. Tollens. 2004. Gender and cassava processing in Africa. *Quarterly Journal of International Agriculture*, Vol. 43 (1): 57-69.
- [14]Ericksen, P. J., 2008, *Conceptualizing food systems for global environmental change research*. *Global Environmental Change*, 18(1), 234-245.
- [15]European Commission, 2020, *Green Deal*, https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en, Accessed on February 2021
- [16]Eurostat, European Statistical System, European Commission, <https://ec.europa.eu/eurostat>
- [17]FAO, 2011, *Guide for policy and programmatic actions at the country level to address high food prices*. FAO's Initiative on Soaring Food Prices. Rome, www.fao.org/fileadmin/user_upload/ISFP/reviseISFP_guide_web.pdf
- [18]FAO, 2014, *The State of Food and Agriculture: Innovation in family farming*. Food and Agriculture Organization of the United Nations. Retrieved from <http://www.fao.org/publications/sofa/2014/en/>, Accessed on June 2021
- [19]FAO, 2018, *The future of food and agriculture: Alternative pathways to 2050*. Food and Agriculture Organization of the United Nations. <http://www.fao.org/3/I8429E/i8429e.pdf>, Accessed on November 2023
- [20]FAO, IFAD, UNICEF, WFP, & WHO, 2017, *The State of Food Security and Nutrition in the World: Building resilience for peace and food security* (No. 978-92-5-109888-2; pp. 1–109).
- [21]Foley, J. A., DeFries, R., Asner, G. P., Barford, C., Bonan, G., Carpenter, S. R., Chapin, F. S., Coe, M. T., Daily, G. C., Gibbs, H. K., Helkowski, J. H., Holloway, T., Howard, E. A., Kucharik, C. J., Monfreda, C., Patz, J. A., Prentice, I. C., Ramankutty, N., Snyder, P. K., 2005, *Global consequences of land use*. *Science*, 570–574.
- [22]Frison, E.A.; IPES-Food, 2016, *From uniformity to diversity: a paradigm shift from industrial agriculture to diversified agroecological systems*, Belgium, 96 p.
- [23]Garnett T., 2011, *Where are the best opportunities for reducing greenhouse gas emissions in the food system (including the food chain)?*, *Food Policy*, Volume 36, Supplement 1, S23-S32,
- [24]Geels, F. W., 2002, 'Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and case-study', *Research Policy*, 31 (8-9): 1257-1274.
- [25]Gordon Line, J. et al, 2017, *Rewiring food systems to enhance human health and biosphere stewardship*, *Environ. Res. Lett.* 12 100201.
- [26]Harriss-White, B., 2005, *Commercialisation, commodification and gender relations in post-harvest systems for rice in South Asia*, *Economic and Political Weekly*, 40(25): 2524. Frison, E.A.; IPES-Food, 2016,

From uniformity to diversity: a paradigm shift from industrial agriculture to diversified agroecological systems. Louvain-la-Neuve (Belgium): IPES, 96 p.

[27]HLPE, 2013, Investing in Smallholder Agriculture for Food Security. A report by the High-Level Panel of Experts on Food, Security and Nutrition of the Committee on World Food Security, Rome.

[28]HLPE, 2014, Food losses and waste in the context of sustainable food systems. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome..

[29]HLPE, 2017, Nutrition and food systems. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome.

[30]ILOSTAT, 2019, International Labour Office, World Employment and Social Outlook: Trends 2019 Report, Geneva

[31]INSSE, National Institute of Statistics, <http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table>, Accessed on 15 February 2025.

[32]International Food Policy Research Institute (IFPRI), 2016, Global Food Policy Report, Washington, DC: International Food Policy Research Institute.

[33]IPBES, 2019, Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES Secretariat, Bonn, Germany. 1148 pages, <https://doi.org/10.5281/zenodo.3831673>

[34]IPES-Food, 2015, The New Science of Sustainable Food Systems: Overcoming Barriers to Food Systems Reform, Louvain-la-Neuve: International Panel of Experts on Sustainable Food Systems

[35]IPCC, 2019, Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems [P.R. Shukla, J. Skea, E. Calvo Buendia, V.

[36]MADR Ministry of Agriculture and Rural Development, Romania

[37]Mason, P., Lang, T., 2017, Sustainable Diets: How Ecological Nutrition Can Transform Consumption and the Food System (1st ed.). Routledge. <https://doi.org/10.4324/9781315802930>

[38]McKeon, Nora, 2015, Food Security Governance: Empowering communities, regulating corporations, New York: Routledge.

[39]Meadows, D., 1999, Leverage Points: Places to Intervene in a System. Hartland: The Sustainability Institute

[40]Nguyen, H., 2018, Training course “Introduction to sustainable food systems and value chains.” The course was developed and piloted under FAO Strategic Programme 4 (SP4) and executed by the Agricultural Development Economics Division (ESA) with broad consultation from other FAO Divisions and decentralized offices.

[41]NSP 2021-2027, Romania's National Strategic Plan for Agriculture 2021-2027

[42]Pothukuchi K., Kaufman J.L., 2000, The Food System, Journal of the American Planning Association, 66:2, 113-124, DOI: 10.1080/01944360008976093

[43]Reardon, T., Barrett, C. B., Berg, T., Swinnen, J., 2019, Agrifood systems and rural development in the 21st century: A global perspective. In Handbook on the Globalization of Agriculture (pp. 1-23). Edward Elgar Publishing.

[44]SAPEA, 2020, European Commission, Directorate-General for Research and Innovation, Group of Chief Scientific Advisors, Towards a sustainable food system: moving from food as a commodity to food as more of a common good: independent expert report, Publications Office.

[45]Standing Committee on Agricultural Research-Food System, SCAR-FS, 2024, <https://scar-europe.org/food-main-actions/food-systems-partnership>, Accessed on: December 2024,

[46]Springmann, M., Clark, M., Mason-D'Croz, D., Wiebe, K., Bodirsky, B. L., Lassaletta, L., de Vries, W., Vermeulen, S. J., Herrero, M., Carlson, K. M., Jonell, M., Troell, M., DeClerck, F., Gordon, L. J., Zurayk, R., Scarborough, P., Rayner, M., Loken, B., Fanzo, J., ... Willett, W., 2018, Options for keeping the food system within environmental limits, Nature, 562(7728), 519–525, <https://doi.org/10.1038/s41586-018-0594-0>

[47]Swinburn BA, Kraak VI, Allender S, Atkins VJ, Baker PI, Bogard JR, Brinsden H, Calvillo A, De Schutter O, Devarajan R, Ezzati M, Friel S, Goenka S, Hammond RA, Hastings G, Hawkes C, Herrero M, Hovmand PS, Howden M, Jaacks LM, Kapetanaki AB, Kasman M, Kuhnlein HV, Kumanyika SK, Larijani B, Lobstein T, Long MW, Matsudo VKR, Mills SDH, Morgan G, Morshed A, Nece PM, Pan A, Patterson DW, Sacks G, Shekar M, Simmons GL, Smit W, Tootee A, Vandevijvere S, Waterlander WE, Wolfenden L, Dietz WH., 2019, The Global Syndemic of Obesity, Undernutrition, and Climate Change: The Lancet Commission report, Lancet, 791-846.

[48]The Food Systems Countdown Initiatives, FSCI, 2023.

[49]UNEP, 2016, Food Systems and Natural Resources. A Report of the Working Group on Food Systems of the International Resource Panel. Westhoek, H, Ingram J., Van Berkum, S., Ozay, L., and Hajer M.

[50]Utilized Agricultural Area – SAU

[51]Willett, W., Rockström, J., Loken, B., et al., 2019, Food in the Anthropocene: The EAT-Lancet Commission on Healthy Diets from Sustainable Food Systems. The Lancet, 393, 447-492, [https://doi.org/10.1016/S0140-6736\(18\)31788-4](https://doi.org/10.1016/S0140-6736(18)31788-4)