Achieving sustainability in family farming

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ABSTRACT

While small-scale farming households constitute a large part of the population, as well as the producers of the majority of food supplies in low- and middle-income countries, major gaps remain in the ability to produce reliable solutions to achieve sustainability in family farming.

This special issue aims to address some blind spots and shed new light on sustainability in family farming using sustainability science. The publications presented in this special issue will enable readers to grasp the importance of a detailed and situated understanding of the needs and practices of family farming, as well as the importance of involving farmers and their families in our research to find solutions for improving the sustainability of family farming that will benefit everyone.

In low- and middle-income countries (LMICs), small-scale farming households constitute a large part of the population (United Nations Department of Economic and Social Affairs, Population Division, 2022), as well as the producers of the majority of a very diverse set of commodities in Sub-Saharan Africa, Southeast Asia, and South Asia (Herrero et al., 2017), and this will persist in the coming decades. As a result, small-scale farming households play a critical role in the production systems of local and global food systems. Yet, most of them are suffering from poverty and food insecurity and face massive environmental changes: pressure on land use and land degradation, water scarcity, environment pollution, biodiversity loss and climate change.

While many articles in agricultural and food systems research have been published, major gaps remain in the ability to produce reliable solutions to achieve sustainability in family farming. The majority of agricultural-research publications is not relevant to the needs of smallholders and their families, mainly because the majority of studies involved researchers only, without any participation from farmers (Nature Editorial, 2020). Furthermore, most researchers came from high-income countries (HICs) and provided a biased view ignoring LMIC knowledge, experiences, and perspectives of their challenges (Fanzo et al., 2020). In addition, there is a lack of both understanding and analysis of linkages between ensuring food security, and achieving productivity and sustainability in agricultural systems (Lipper et al., 2020). This special issue aims to address these blind spots and shed new light on sustainability in family farming using sustainability science. Sustainability science is a field of science that looks at the complex interconnections between natural, social and technical systems, and how these interactions affect, over time and space, the planet's life support systems, socioeconomic development and human well-being. But sustainability science is also a new approach to the way scientific research is conducted, encouraging scientists to bring their knowledge closer to that of the many actors in society (Dangles and Fréour, 2023).

The publications in this special issue will be presented and linked through a food systems approach. A food systems approach encompasses the broad spectrum of activities, drivers and outcomes across the food systems, their interconnectedness and interactions, the feedback loops and tradeoffs across scales, and the actors involved in their governance (Fig. 1). The first theme of the special issue seeks to better understand the needs and practices of smallholders and their families as key actors in food systems, with diverse perspectives of needs of smallholders from US (Mpanga et al., 2021), Croatia (Božić et al., 2022), and Thailand (Bernard Formoso, 2021), and some practices like arthropod management (Tatiana et al., 2022). The second theme explores various direct or indirect drivers that farmers have had to face and will have to face in the future, such as impact of agricultural land expansion (Jellason et al., 2022) impact of pandemics like the one of COVID-19 (Rathnayake et al., 2022), and impact of phytosanitary products on the environment (Le Bars et al., 2022). The last theme examines the multiple consequences of a range of potential solutions to improve the sustainability of family farming, such as addition of mulch (Kuonen and Norgrove, 2022), certification (Córdoba et al., 2022), agro-ecological transition (Tapsoba et al., 2023) and intensification of ecological soil functions (Trap and Blanchart, 2023).

The food systems approach allows a better understanding of the needs and practices of farmers and their families as key players in food systems, and therefore to better understand how these practices could be sustainable. In Arizona in United States, where the state plays an essential role in encouraging the use of sustainable farming practices, Mpanga et al. (2021) documented the clear trend to use sustainable and regenerative agricultural practices among small-scale farmers, independently of income type from the farm and gender of the farmers. While such a trend towards more sustainable practices is encouraging, what about the motivations for adopting these practices? This is the question that Božić et al. (2022) have tried to answer and they found

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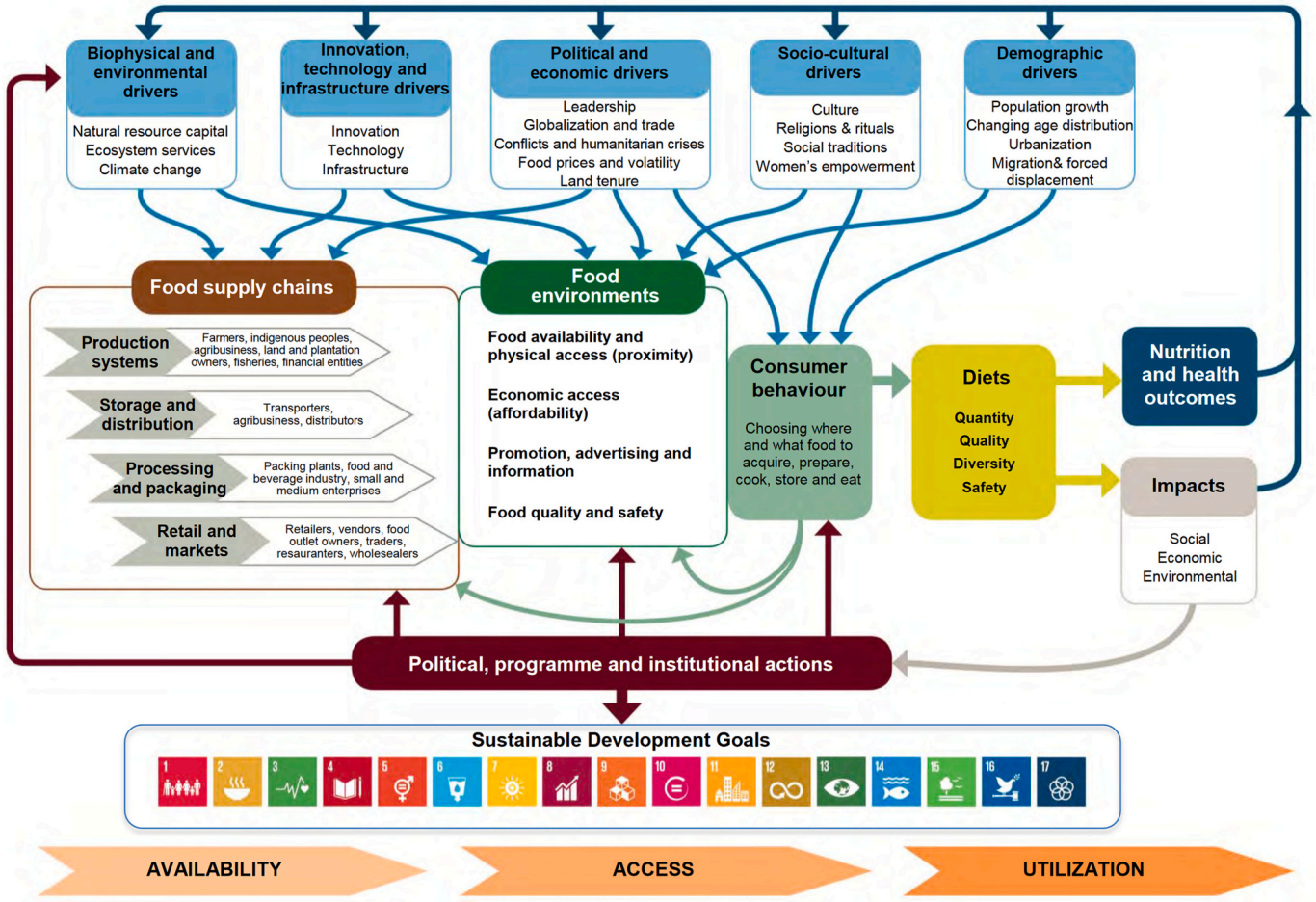

Fig. 1. Conceptual framework of food systems. The different components of food systems, their drivers and outcomes are interconnected (HLPE, 2017).

that Croatian organic farmers have ambivalent relationships between the sustainability dimensions. The farmers were far more sensitive to the ecological dimension than to the economic one, the former being an important objective in its own right while the latter being a strict necessity imposed by the need to survive in a competitive market. As for the social dimension of sustainability, this was unsatisfactory due to the lack of capacity to influence the agricultural sector. In other settings, it is more difficult for farmers to make the transition towards sustainable farming practices. Using a knowledge co-development approach in two rural villages of small-scale farmers in Thailand, Bernard Formoso (2021) shows that although the farmers have become aware of their precarious situation and are informed of the long-term benefits of organic farming, many socio-economic factors (such as debt) continue to hinder their conversion to more sustainable, non-chemical farming. By dint of this, the villagers have developed a pessimistic view of the future. More broadly, there are still major grey areas in our knowledge of practices in family farming. For example, Tatiana et al. (2022) conducted a systematic review to better understand the synergies and trade-offs between arthropod services and disservices in family farming and found many gaps in knowledge. The authors launch an urgent and needed appeal to develop a more holistic approach of arthropod communities, both detrimental and beneficial to people, in cultivated and surrounding natural habitats.

The food systems approach also allows a better understanding of the various direct and indirect factors that farmers have had to face and will have to face in the future, and how this may affect their activities and those of their communities. For example, using participatory approaches, Jellason et al. (2022) explored local understanding of the different impacts of agricultural land expansion with smallholders in four communities in Ghana and Ethiopia. Not only did they show that only a few community members are able to undertake the expansion of their farmland, but they also demonstrated that this expansion is to the detriment of the most precarious households and thus exacerbates existing inequalities within the community. On another note, the direct and indirect factors influencing the food systems may be cumulative. For example, Rathnayake et al. (2022) showed that the COVID-19 pandemic increased the vulnerability of vegetable growers in the long term in Sri Lanka, as in many other countries around the world. In addition, a policy decision by the Sri Lankan government has restricted and banned the import of agrochemicals since 2021, even though the current vegetable production system in Sri Lanka is very intensive in terms of fertilizers and insecticides, further threatening the vulnerability of farmers if they are not accompanied in an output of these products. However, the reduction of insecticides is an important element in the sustainability of family farming. Le Bars et al. (2022) assessed the level of contamination of the water used for urban market gardening in Bamako, Mali, and demonstrated that the majority of market gardeners used different types of insecticides intensively in order to eliminate insects that destroy fruit and vegetables, threatening the very existence of their activity. As a results, the authors highlight the need for changes in agricultural practices, with the use of biopesticides, which would ultimately reduce the risks to the environment and people's health.

Finally, the food systems approach allows to understand the multiple consequences of any solution proposed to farmers on all the other food system actors in terms of nutrition and health, as well as social, economic and environmental issues. For example, Kuonen and Norgrove (2022) carried out a systematic review of the literature to better understand of how the addition of mulch affects maize yields on soils in

tropical regions where family farms are heavily involved in maize production. They found that mulching generally improved maize yields, and that the positive effect of mulch was greater when combined with mineral fertilizer, implying a synergistic rather than a substitutional effect. While they have shown that this practice seems to be virtuous for everyone, other studies show that certain solutions have very different effects depending on the situation of the farmers. Using the concept of politics and practice of grounding, Córdoba et al. (2022) examined how certification is shaping production relationships between oil palm farmers within contract farming programmes in Brazil. They found that certification made it more difficult for some producers to join the contract farming system due to the lack of title deeds and their inability to comply with standards and environmental regulations, that only more capitalized farmers in contract farming models can likely benefit from certification. As mentioned above, all solutions need to be considered in the light of farmers' actual needs and practices. Tapsoba et al. (2023) analyzed the performance of farm households in Benin and Burkina Faso using the TAPE tool developed by the FAO and identified three classes of farms. Although different in terms of productions, practices and organizations, these farms have a low agroecological performance and will have to take different paths to achieve greater sustainability. In the same spirit, Trap and Blanchart (2023) proposed a methodological framework (SECURE for Soil Ecology Cure) to promote the intensification of ecological soil functions based on improved local knowledge on the relationships between biodiversity (organisms) – processes – functions – services and illustrated this approach with case-studies from Madagascar.

Several key messages emerge from the work presented in this special issue. First, family farming takes on very different realities depending on their geographical contexts and their socio-economic characteristics, requiring a detailed and situated understanding of their needs and practices in order to face up to the challenges of sustainability (e.g. Bernard Formoso, 2021). In this respect, there is an urgent need to better understand the disadvantages and inequalities faced by women in family farming, including in the context of farm succession. The second message is that the challenges facing family farming are multiple and affect a range of very different fields such as the environment, agronomy, economics and health, requiring at least interdisciplinary approaches in order to understand these challenges and find solutions. More approaches of this kind are needed to keep filling the knowledge gap in understanding how family farming, in their specific context, produce, access and consume food, generate income and manage biodiversity and the environment. The last, and may be most important message is that the solutions for improving the sustainability of family farming will not benefit everyone depending on their socio-economic level (e.g. Córdoba et al., 2022; Jellason et al., 2022), which means that we need more than ever to involve farmers and their families in our research (e.g. Trap and Blanchart, 2023). Echoing the call by Dangles and Fréour (2023), we invite our readers to rethink research on family farming by combining disciplines around societal challenges, by co-constructing solutions with society, by integrating different forms of knowledge, by taking into account the different levels at which solutions can be provided to drive the transformations necessary to achieve sustainability in family farming.

Declaration of Competing Interest

Authors do not have any conflict of interest.

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