OPERATIONALIZING FARM SUSTAINABILITY, PARTICULARITIES FROM THE BEEKEEPING SECTOR

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Abstract

The activity of beekeeping is essential not only for agricultural production, but also for mankind. Even though beekeeping has been producing honey and other bee products for thousands of years, it is still quite poorly understood and analysed as a professional activity. In light of the challenges facing the sector today, integrating sustainability into beekeeping practices becomes not only optional, but necessary. In recent years, the concept of sustainability has received increasing attention in debates on agricultural policies, and stakeholders have become more and more interested in monitoring and evaluating agricultural practices. Still, assessing sustainability involves "breaking" its dimensions into various factors using indicators that provide information. This can often prove to be difficult to operationalize. Nevertheless, the matter of operationalizing sustainability was approached through different models which have led to numerous proposals for measuring and evaluating sustainability in the agricultural sector. However, despite the similarities, the beekeeping sub-sector is distinguished from the agricultural one by a number of characteristics which obviously need to be included in the models for assessing sustainable development. Therefore, this paper aims to consider the multitude of economic, social, environmental and governance particularities of Romanian beekeeping farms based on literature, and bring them forward through a bee farm sustainability assessment model.

Keywords *Sustainability, Farm Sustainability Assessment, Beekeeping Sector*

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1. Introduction

Sustainability has been discussed and understood as a paradigm which has its dimensions (namely economic, social and environmental) at balance and that aims to enhance the life quality of future generations (Costache et al., 2021). More, according to United Nation's Brundtland Report, sustainable development may be depicted as the institutional projection of the sustainability concept (WCED, 1987). Despite the fact that literature provides dozens of definitions on sustainability, the most accepted variants include the triple bottom line approach and the transgenerational factor (Henriques and Richardson, 2004). Still, along the various opinions that revolve around sustainability conceptualization, the difficulty of operationalizing it stands out (Gillespie, 2001).

Beekeeping, as a branch of agriculture, is relatively a small sub-sector in comparison to other agricultural sub-sectors. Yet, it is highly recognized, including at institutional level due to its fundamental contributions to ensuring pollination services (European Commission, 2020). Also, beekeeping is seen as a sub-sector that has considerable potential to generate value. In Romania, the beekeeping activity is widespread among farmers and the country positions itself between the top EU honey producers, with over 20.000 beekeepers (European Commission, 2020).

2. Key Aspects of Sustainability in Agribusiness

Agribusinesses incorporate a multitude of manufacturing sectors, including the agricultural one, being one of the main players at global level in terms of employment, output value, income and international trade (Wiśniewska, 2015; FAO, 2016). Also, small-scale producers account for and cover more than 70% of the food needs worldwide (FAO, 2016); in fact, the primary function of agribusinesses is to provide the necessary quantity and quality of food in order to meet population's needs. Thus, when food security along with biodiversity are ensured, then they are considered a direct result of the interplay between agribusinesses and sustainability (Wiśniewska, 2015).

In recent years, it has become clearer that the modern society encapsulates a series of environmental and social threats, and therefore the idea of sustainable agribusinesses has arisen. In business, sustainability is explained as fulfilling stakeholders' needs without compromising the ability of the firm to fulfil its own needs in the future (Dyllick and Hockerts, 2002).

More, the contributing role of agribusinesses to sustainability has also been recognized at institutional level. Beginning with 2016, United Nations (UN) launched the 17 Sustainable Development Goals (SDGs) which seek to improve the lives of generations to come (United Nations, 2021). Two of the 17 SDGs are directly connected to the agribusiness sector: Goal 2 (focused on sustainable agriculture and food security, as well as on the need to create more innovative agricultural systems) and Goal 12 (focused on ensuring a sustainable production and consumption in the food industry).

The SDGs were soon acknowledged by the European Union (EU), which became involved in monitoring Community's progress on the Goals. Also at EU level, the Common Agricultural Policy (CAP) aimed at supporting rural development is lined up with the SDGs (European Commission, 2021). Furthermore, recent efforts show the increasing interest on EU's side to research and innovate sustainable agriculture and food security through its "Horizon 2020" programme (European Commission, 2021). Besides Horizon 2020, the Farm to Fork strategy – depicted in the European Green Deal – looks to promote sustainable food consumption and reduce the negative environmental impact of agribusinesses (European Commission, 2021). Last but not least, in relation to the beekeeping sector, the EU considers the role of beekeepers crucial to achieving sustainability, and therefore it supports the beekeeping sector through the National Apiculture Programme, providing for the current 2020-2022 period funds that reach €240 million (European Commission, 2021).

3. (Bee) Farm Sustainability. The Road to Conceptualization and Operationalization

Prevalent literature states that agribusinesses that intend to contribute to sustainable agriculture need to be economically viable, socially viable, environmentally oriented and transmissible to future generations (Parent et al., 2013). Economic viability refers to generating revenues in the long run, while social viability encompasses the farm's efforts to contribute to farmers', their families and community's wellbeing. Environmental orientedness reflects on resource utilization.

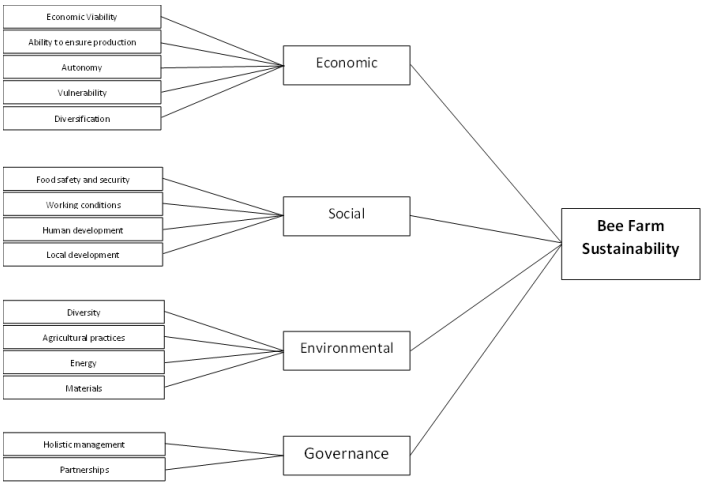
The balance of the three notorious pillars of sustainability – economic, social and environmental – also known as the triple bottom line (Adams, 2006) is referred to in the literature as the classical view on sustainability, being historically used in assessing farm sustainability (Hansen, 1996).

Actually, the majority of papers written on the theme rely on the triple bottom line (Chopin et al., 2021). Nevertheless, some other perspectives emerged, such as introducing a fourth dimension – from the governance or institutional sphere – which led to the "Four Spheres" perspective or the "Tetrahedral Model" (Chopin et al., 2021; O'Connor, 2007). Governance is key in ensuring productive agricultural systems (Dasgupta and Roy, 2011) and effective governance is considered the foundation of reaching agricultural sustainability (Talukder et al., 2020).

International organizations such as Food and Agriculture Organization (FAO) elaborated on initiatives like Sustainability Assessment in Food and Agriculture Systems (SAFA) that underlined the need to innovate the concept of sustainability (FAO, 2014). The SAFA tool has built on corporate social responsibility in including governance as a fourth dimension of sustainability, which captures holistic management, corporate ethics, participation, accountability or rule of law. Under SAFA's interpretation, governance is a decision-making process that also focuses on overseeing implementation at economic, social and environmental scales. Following this logic, without good governance, economic, social and environmental sustainability could not be achieved. Some critical opinions argued that SAFA guidelines on governance are more applicable to companies instead of farms (Schader et al., 2014). Nevertheless, authors like Gaviglio et al. (2016) claim that avoiding this fourth dimension is aimed at rather steering clear of potential conceptual difficulties.

Further on, this paper takes into consideration the fourth dimension of governance as a component of farm sustainability assessment in the beekeeping sector (Figure 1). The choice to take it into account was supported by the need to boost innovation at conceptual level. Nonetheless, it is well understood that SAFA guidelines are not universally applicable to all farms, which highlights the need to build a distinct framework, especially in the beekeeping sector, considering its particularities.

Figure 1: Bee Farm Sustainability Assessment Model Proposal



Source: Own processing, adapted from literature

Despite the attempts to develop sustainability assessment methods at farm level, achieving a single and integrated model seems to be difficult to attain. Also, considering the complexity of the concept, it is worth underlying that the efforts should be focused on obtaining a robust representation of agricultural sustainability (De Luca et al., 2017).

Following the literature review, below is listed a selection of themes and indicators (Table 1) proposed for evaluating sustainability at farm level in the beekeeping sector. The choice was to propose an aggregative structure, which has already been used by other studies (FAO, 2014; Zahm et al., 2008), since it allows to conduct the analysis at different levels (and different time periods) and to allow farm benchmarking.

Table 1: Proposed dimensions and themes for assessing sustainability at farm level in the beekeeping sector

Dimension	Theme	Theme conceptualization	Theme operationalization	Research on the theme
Economic	**Economic viability**	Type of measurement that reflects the economic state of a farm through efficiency and securing income sources in face of market	(1.) Multiple buyers; (2.) Multiple income sources; (3.) Production value; (4.) Differentiated products; (5.) Records of production, income, costs and profits; (6.) Expenditure as part of revenues	Bertocchi et al., 2016; Gaviglio et al., 2017; Kouchner et

		uncertainties (Zahm et al., 2008).	generated; (7.) Economic efficiency of activities; (8.) Integrated activities; (9.) Multiple distribution channels; (10.) Investments; (11.) Financial resources for investments; (12.) Transmissibility.	al., 2019; Van Cauwenberg h et al., 2007; Zahm et al., 2008
	Ability to ensure production	The capacity of a agricultural production system to optimally utilize resources (Zahm et al., 2008).	(1.) Traceability; (2.) Means of production; (3.) Animal access to feeding resources; (4.) Mobility system (transhumance).	Kouchner et al., 2019; Zahm et al., 2008
	Autonomy	A reflection of ensuring the medium-term continuation of the farm activity through its investment capacity and ability to adapt to subsidy reductions (Zahm et al., 2008).	(1.) Financial autonomy on loans (2.) Independence over subsidies; (3.) Subsidies relative to income.	Bertocchi et al., 2016; Gaviglio et al., 2017; Kouchner et al., 2019; Zahm et al., 2008
	Vulnerability	The occurring possibility of loss and damage associated to climatic unpredictability (Lavell., 2012)	(1.) Compensation provided over bee colonies, if affected; (2.) Bee colonies insurance; (3.) Measures taken on reducing the risk of natural conditions variability.	FAO, 2014; Lavell et al., 2012
	Diversification	Capacity - of an agricultural system - of being resilient in the face of market changes (Gaviglio et al., 2017) and minimising risks associated with economic circumstances and climatic unpredictability (FAO, 2014).	(1.) Product diversification; (2.) Diversification degree contribution to reducing the negative effects of natural conditions variability; (3.) Additional processes to increase the price; (4.) Quality certified production; (5.) Organic certified production; (6.) Non-agricultural multifunctionality.	Bertocchi et al., 2016; FAO, 2014; Gaviglio et al., 2017; Zahm et al., 2008
Social	**Food safety and security**	Compatibility of production capacity with the demand (Van Cauwenbergh et al., 2007).	(1.) Farm's production capacity to meet demand levels; (2.) High quality products; (3.) Product diversity levels; (4.) Product capitalization through the use of traditional practices; (5.) Ensuring formal food safety and security.	Barth et al., 2017; FAO, 2015; Van Cauwenberg h et al., 2007;
	Working conditions	Reflects a decent personal and professional life quality of workers (Zahm et al., 2008).	(1.) Providing compensation over minimum wage levels to workers; (2.) Providing compensation on a regular basis to workers; (3.) Providing workers the ability to negotiate their compensation levels; (4.) Avoiding workers exposure to activities that might harm them; (5.) Distance until hospital in	FAO, 2014; Gaviglio et al., 2017; Kouchner et al., 2019; Zahm et al., 2008

			case of accident at work; (6.) Workers access to water and sanitation groups.	
	Human development	Similar to "Working conditions" theme; Reflects the match between the beekeeper and its work in terms of farm management, recognition and professional and personal life balance (Kouchner et al., 2019).	(1.) Measures that prohibit abusive behaviors at work; (2.) Obtaining a better life quality of workers; (3.) Workers' ability to spend parts of their income on recreational activities; (4.) Equal work opportunities; (5.) Professional development opportunities; (6.) Freedom of expression.	Bertocchi et al., 2016; Gaviglio et al., 2017; Kouchner et al., 2019; Zahm et al., 2008
	Local development	A process that aims to improve the economic, social and ecological state of a certain area through the use of local resources (Dawkins, 2003).	(1.) Willingness to hire workers from minority groups at the same wage levels to those workers that belong to the dominant group; (2.) Local community as primary source for human resource; (3.) Involvement in community development projects; (4.) Contribution to general public understanding of the importance of beekeeping sector in agricultural production; (5.) Contribution to socio-economic and environmental development of the area; (6.) Knowledge and ability transfer to upcoming generations; (7.) Raising awareness on floral resources quality and availability; (8.) Communication with other beekeepers on existing sanitary and genetic problems in the area.	Dawkins (2003); FAO, 2015; Gaviglio et al., 2017; Milan-Garcia et al., 2019
Environmen-tal	**Diversity**	Reflects the diversity degree of plants and animals at farm level (Gaviglio et al., 2017)	(1.) Preserving and enhancing the genetic material of species; (2.) Bee selection variety; (3.) Pollinated plants variety; (4.) Interest in the competition over food resources; (5.) Activity's impact on local biodiversity.	Bertocchi et al., 2016; FAO, 2014; Gaviglio et al., 2017; Kouchner et al., 2019; Van Cauwenberg h et al., 2007; Zahm et al., 2008
	Agricultural practices	Refers to practices that may directly affect farm's environmental performance (Gaviglio et al., 2017).	(1.) Care/treatment of animals; (2.) Awareness over the risk of contaminations caused by veterinary treatments; (3.) Utilizing the traditional extraction method for harvesting; (4.) Not harming the natural habitat through farm's activities.	Bertocchi et al., 2016; FAO, 2014; Gaviglio et al., 2017; Kouchner et al., 2019
	Energy	The propensity of an agricultural system to		Bertocchi et al., 2016;

		efficiently utilize environmental resources and to operate at the lowest ecological cost through farm's capability of using renewable energy (Zahm et al., 2008).	(1.) Autonomy over conventional energy resources; (2.) Measures on energy consumption efficiency; (3.) Obtaining energy consumption efficiency; (4.) Utilizing renewable energy sources.	FAO, 2014; Gaviglio et al., 2017; Kouchner et al., 2019; Van Cauwenberg h et al., 2007; Zahm et al., 2008
	Materials	The propensity of an agricultural system to efficiently utilize environmental resources and to operate at the lowest ecological cost through farm's capability of not consuming materials and not generate pollution (Zahm et al., 2008).	(1.) Capitalizing obtained residues following the beekeeping activity; (2.) Measures on reducing material losses following the beekeeping activity; (3.) Reutilizing or recycling used materials at farm level; (4.) Not harming the environment through the used materials.	Barth et al., 2017; FAO, 2014; Gaviglio et al., 2017; Zahm et al., 2008
Governance	**Holistic management**	Process that involves decision-making and implementation on aspects regarding practices that determine farm's stability (FAO, 2014).	(1.) Informing on changes that occur in the market; (2.) Informing on legislation related novelties in the field; (3.) Planning the beekeeping activity; (4.) Measures on maintaining a high quality of production; (5.) Evaluating on a regular basis the quality of production; (6.) Actively seeking development opportunities for the farm; (7.) Expressing a favorable attitude towards adopting new technologies; (8.) Integrating new technologies.	FAO, 2014; Gaviglio et al., 2017; Schader et al., 2014; Vapa-Tankosic et al., 2020
	Partnerships	Collaboration that aims for enhancing food security, preserving natural resources and eradicating poverty (FAO, 2014).	(1.) Seeking partners for optimizing sales; (2.) Recognizing the importance of the relationship with buyers; (3.) Solving conflicts amicably; (4.) Communicating with farmers over utilized practices on floral resources.	Barth et al., 2017; FAO, 2014; SAI Platform, 2018

Source: Own, based on cited sources

After the data collecting process, the approach involves statistical elaboration. This can be applied through the lens of descriptive analysis (explores the main attributes of the sample with the help of descriptive statistics through means, standard deviations and not only) or data reduction analysis (factor analysis used to summarize information from the original database).

4. Conclusions

The conducted review revealed that there is a lack of consistent research focused on the beekeeping sub-sector in matters of sustainability assessment at farm level. Nonetheless, various efforts have been headed towards designing a methodological framework that assesses sustainability in agribusiness, in general. Although these frameworks are represented in different ways, the classical view of sustainability that encompasses the economic, social and environmental pillars concurs and dominates.

Further, the paper proposed an approach regarding bee farm sustainability assessment through the construction of both a conceptual framework as well as an analytical one. The work presented is aimed at providing a tool that adapts to beekeeping farms, considering the agronomic, economic and social issues that farmers face. Moreover, according to SAFA's guidelines and recent research, a fourth dimension of sustainability – namely governance – was added. This intends to uphold to innovation in matters of conceptualization and comprise a broader view of sustainability that reflects to a larger extent farmers' decision-making processes which are ultimately linked to the results projected in the triple bottom line.

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