

Article

Assessing Agri-Food Start-Ups Sustainability in Peri-Urban Agriculture Context

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Abstract: Latest international directives indicate the need for sustainable development, linking socio-economic and environmental aspects, to reach the goals set by Agenda 2030. In this context, peri-urban agriculture can represent the opportunity to increase cities' sustainability, improving their liveability level, fulfilling a crucial social part since it assures new sources of job opportunities and territorial requalification. This study presents a peri-urban requalification experience, conducted in Milan, Italy, where, within the European funded project OpenAgri, eight agri-food start-ups began their activities in a peri-urban area at the southern gates of the city. The study aims to assess and evaluate these start-ups' sustainability using the Sustainability Assessment of Food and Agriculture systems (SAFA), which considers four sustainability pillars: Good governance, economic resilience, environmental integrity and social well-being. The application of SAFA indicators to the eight start-ups revealed their positive aspects and some limitations, typical of some not structured enterprises. The research describes a scalable and replicable example of peri-urban agriculture's potentiality in solving environmental, social and economic issues and tests FAO's SAFA framework, which is still unexplored in this sustainability assessment context.



Citation: Zanzi, A.; Vaglia, V.; Spigarolo, R.; Bocchi, S. Assessing Agri-Food Start-Ups Sustainability in Peri-Urban Agriculture Context. *Land* **2021**, *10*, 384. <https://doi.org/10.3390/land10040384>

Academic Editor: Marta Debolini

Received: 3 March 2021

Accepted: 3 April 2021

Published: 7 April 2021

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Keywords: sustainability evaluation; peri-urban agriculture; SAFA tool; entrepreneurship

1. Introduction

1.1. Need for Sustainability

The European Union has profoundly redefined its environmental strategies, as it proves the publication of crucial programmatic documents—Farm to Fork and European Biodiversity Strategy—and the European Green Deal definition. These strategies follow the ambitious goal of making Europe the first climate-neutral continent by 2050, affirming the vital principle of creating a “new, sustainable and inclusive growth strategy to boost the economy, improve people's health and quality of life, care for nature, and leave no one behind” [1]. Similar goals have been previously set by Agenda 2030 [2] with the definition of Sustainable Development Goals (SDGs), where food systems and agriculture cover a crucial role, especially considering goals number 11 and 13. The importance of food systems and agriculture became even more evident analysing Covid-19 pandemic impact [3], which evidenced the worldwide need for a healthy and resilient food system, vital in every possible circumstance and source to promote economic recovery and citizen well-being [4]. In particular, the future food system is described as safe, sustainable, nutritious and affordable, implementing sustainable agronomic techniques (e.g., input reduction) and increasing the cultivated lands [4]. These strategic considerations intersect with some other significant trends observed in the last years. These trends do not regard only the agri-food world, but are due to broader modifications in many social fields that reflect significant changes in the agri-food market, encompassing both consumers and producers. First of all, between consumers, environmental sustainability themes have witnessed a marked increase in interest between consumers, mostly linked to food consumption and a healthier

diet [5]. The boost in demand for sustainable food has caused a consequent upgrade in the offer [6].

Moreover, a new vision of the society is emerging, namely the “green shift”: This shift underlines the importance of renewable resources, effective use—and reuse—of materials, emission reduction, as well as the transition to products and services that have minor negative consequences for the climate than today [7]. Pursuing this shift and related SDGs goals could change the usual way of producing and consuming with the help of innovation and technology that could play a fundamental role in this path [8].

1.2. Peri-Urban Agriculture and Current Global Challenges

Despite this demand for global sustainability, cities and urban agglomerates continue to overgrow: In the last 30 years, cities greatly expanded [9], and the latest long-terms forecasts confirm an increase in world urbanisation—from 56.2 to 60.4% in 2030—even if it is still too early to evaluate the impact of Covid-19 on urbanisation [10]. Due to this trend, urban and peri-urban areas are losing agricultural soils, and the number of farms tends to decrease [11,12], leaving space to new suburbs or urban sprawl, with an overall degradation of natural environments [13].

In the future, agricultural landscapes could provide possible new solutions to these challenges. In particular, peri-urban agriculture (PUA) can play a crucial role in providing sustainable food to local city markets, while connecting urban and rural areas and improving dismissed areas [12]. Today, low-income populations have mostly practised PUA, with significant effects on food security [14] and socio-economic issues. Indeed, in developing countries, low-income citizens can self-obtain fresh products (e.g., vegetables and eggs), even without a stable economic income [15]. However, with the developments of cities and their total dependence on food supplies with close rural areas [16], PUA is assuming a commercial purpose too, creating new business opportunities for the enterprises related to food production, processing and distribution [17,18], also in developed countries [19]. Here, local food request goes hand in hand with socio-economic issues, since the need for urban regeneration and job opportunities, and the growing sensibility between consumers related to sustainability topics [20]. These trends are contributing to shaping new forms of PUA, marked by multi-functionality. Indeed, especially in developed countries, peri-urban farmers do not focus only on staple food production, but offer a series of services to the local community and environment, such as cultural and social opportunities, urban regeneration and aesthetic added values to surroundings [21]. In other words, PUA can provide a wide range of ecosystem services (ES), not only linked to the provision of food and other goods but also cultural and regulating ones (Figure 1).

Among the provided ES, PUA can contribute to reshape the food supply panorama actively. Indeed, there is an increase in promoting smart and resilient activities to rethink peri-urban areas, where ecosystem restoration can provide net benefits [22]. The latest data [23] show that, in developed countries, agriculture mainly produces for the global agri-food industry, with just 20% of the products marketed locally. Even if local supply chains—e.g., direct sales and farmhouses—are already well-known, their overall impact is still limited, even if growing [24]. Different aspects are pushing this growth: (i) Urban population increase; (ii) higher demand of raw food; and (iii) more significant consumers’ sensibility about sustainability, resulting in the development of local agri-food sectors, to satisfy local demands and to structure new models of short supply chains on a territorial scale, with the creation of Local Agrifood Systems (LASs). LASs can cut food supply chain, retain most local market production, and shorten the relation between growers and consumers [25]. In this view, LASs can represent an optimal solution to stimulate the requalification of peri-urban context, with PUA implementation and an overall economic, occupational, social, cultural, and environmental enhancements. However, this formula has several expressions: Indeed, it depends on territorial and environmental conditions, socio-economic context, political views, and cultural awareness.

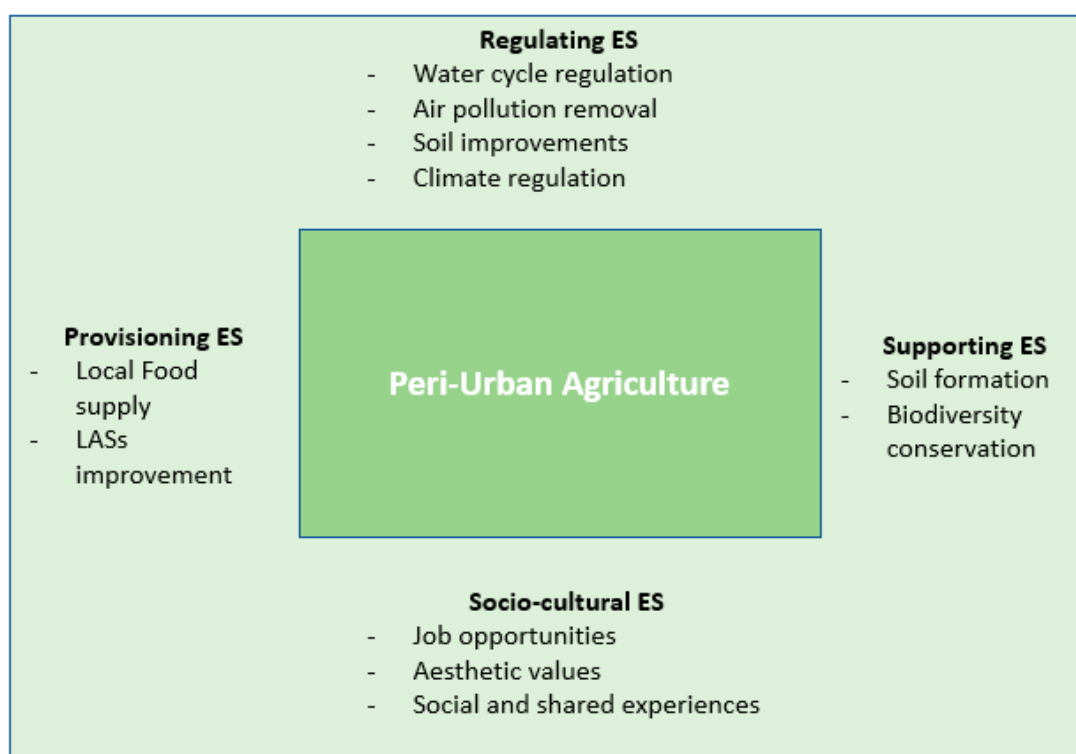


Figure 1. The wide range of Ecosystem services granted by peri-urban agriculture.

Furthermore, the concept of “local” is ambiguous in many ways: e.g., according to United States rules [26], a good produced within 400 miles (643 km) from the place of consumption, and in any case within the borders of a state, can be defined locally. If it fits in the U.S. context, this definition is not suitable to the European one, where a product is definable as “local” if produced, processed and retailed within a defined geographical area within a 20 to 100 km radius approximately [27]. Moreover, in the EU context, there is a closer focus on the link between local production and its perceived properties (e.g., ecologically sustainable, healthy, traditional, respectful of biodiversity) [28].

This research presents a case study where the implementation of a LAS contributes to the birth of local agri-food start-ups, developing new job opportunities. Therefore, start-up incubators can shape urban and peri-urban areas’ economy and provide several ES related to their activities, including providing local food supply [21].

1.3. Tools and Framework for Sustainability Assessment in Agricultural Contexts

In this dynamic context, the evaluation of the contribution of agriculture—and PUA—to sustainable development and the connected socio-economic effects has gained researchers and institutions’ attentions. FAO has defined sustainable development as “the management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture, forestry and fisheries sectors) conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable” [29]. Sustainable development ecological, economic and social principles received universal agreement at the 1992 Earth Summit: One of the summit’s significant outcomes, Agenda 21, includes a whole chapter (Chapter 14) on sustainable agriculture and rural development [30]. Today, 106 countries have National Sustainable Development Strategies and over 200 voluntary sustainability standards implemented by the food and agriculture industry. However, developing and implementing an integrated approach to analyse different sustainability dimensions in business strategies

remains a significant challenge. In the latest years, to help decision-makers and stakeholders, several frameworks and tools have been developed and tested to assess and quantify the broad contributions of agriculture, with particular attention to its long-term effects. These assessments may regard several aspects, spacing from political to environmental consequences. Table 1 shows the main frameworks available in the literature.

Table 1. Principal frameworks used to evaluate sustainability in agriculture [31].

Framework	Developer	Year of Publication	Focus
Sustainable Intensification Assessment Framework	Michigan State University	2017	Evaluation of agricultural activities and their effects
The Economics of Ecosystems and Biodiversity—TEEB	UNEP TEEB	2011	Ecosystem services assessment and quantification
SAFA—Sustainability Assessment of Food and Agriculture systems	FAO	2014	Farmer/enterprise evaluation based on four sustainability pillars
Sustainable Rural Livelihoods approach	CIRAD	2019	Rural/Family farming assessment
TAPE	FAO	2019	Evaluation of agricultural performances via agroecological indicators
Method to assess sustainability and resilience in farming	SOCLA—Sociedad Científica Latinoamericana de Agroecología	2019	Robustness, adaptability, transformability of farming systems
GTAE—Groupe de Travail sur les Transitions Agroécologiques	CIRAD-IRD-AgroParistech	2017	A framework to drive and evaluate the agroecological transition

Other frameworks are present in literature, with a growing interest in assessing agroecological aspects [31]. As stated by [32], there is no one-size-fits-all solution in this kind of assessment, with the consequent needs to choose the most suitable framework for the context, as it emerges in literature, where several studies could help understand the most suitable choice [33–35].

1.4. Objectives

Since the current high interest around the topics, the present study aims to assess the sustainability level in a peri-urban agriculture context, analysing a series of agri-food enterprises involved in a peri-urban requalification project—the OpenAgri project and its start-ups—in Milan, Italy, where a LAS is forming. The sustainability assessment is conducted applying the FAO’s SAFA framework, thus representing an interesting test for this methodology since it is the first example conducted in a peri-urban agricultural area.

2. Materials and Methods

2.1. Case Study

To conduct the present research, we focused on a particular case of study, the OpenAgri project. This project has some peculiarities, mixing agriculture, entrepreneurship and agri-food system. The project was funded by the EU Urban Innovative Action program, which promotes innovative solutions to rethink and requalify life in urban and peri-urban areas across Europe. Following the legacy of Expo 2015 and the challenges set in the Milan Urban Food Policy Pact (MUFPP) [36], Milan council and other 15 organisations gained the UIA fund after having proposed the requalification of a peri-urban area and its neglected socio-economic and environmental background, implementing a sustainable peri-urban agriculture hub. For the first time, agriculture has been recognised as a possible solution to socio-economic issues in developed and urbanised areas, equating its role to other urban requalification solutions.

OpenAgri main goal is to requalify a ruined peri-urban area—close to Vettabbia river—located in the south part of the city, at the fringe zone of the urban agglomerate, where fields

progressively left space to uncontrolled urban sprawl, just before the Parco Agricolo Sud, the major European agri-area with its 47,000 hectares. The area—35 ha of extension—has a long history and tradition, encompassing medieval abbey—(Chiaravalle), farmstead, and fields. The area has represented a traditional agricultural hub for centuries, at the city's gate, then converted into an industrial and residential suburb in the last fifty years. Transformations have occurred in the area, resulting in an overall environmental degradation, as well as in the local inhabitants' socio-economic tissue, causing the abandonment of the fields and the local farms' crisis.

A requalification is thus needed, involving not only environmental aspects but socio-economic ones too. Indeed, even if Milan is recognised as the economic capital of Italy, situated in the region with higher GDP [37], there is a growing social malaise, in particular with the youngsters: The youth unemployment rate is high (28.6%), and the percentage of NEETs, defined as young population (aged 15–29) not engaged in education, employment, or training, in the metropolitan area is at 17.6%, [38] even before Covid-19 impact.

Furthermore, analysing the consumption data, Milan depends on food provisioning from other areas, having witnessed a widespread land reconversion from agriculture to more profitable businesses. This trend follows the National and European one: In Italy, agricultural production and workforce are declining, with a loss of more than 100,000 people employed in the period 2013–2015 [39]; while in Europe, there has been a loss of 17.5% agricultural jobs in the last ten years [40].

In this context, OpenAgri project wants to requalify this peri-urban area, implementing an open innovation hub on peri-urban agriculture and fostering social inclusion, jobs, and skills creation along the food supply chain, while increasing the level of resilience and sustainability of the city [38]. The project lays on two main pillars: An overall requalification of the area, including the abbey, extensive environmental remediation, and the revitalisation of the local socio-economic tissue. Indeed, after a public bid, eight start-ups were selected to work on OpenAgri fields. These start-ups are focused on food production, and their activity ranges from flowers production and retail to horticulture and seed production, following the goals set by MUFPP: To develop a sustainable food system delivering healthy and accessible food, reducing its waste; to avoid biodiversity loss, making urban food systems more inclusive, resilient, safe, and diverse. OpenAgri, linking together environmental remediation, agri-food start-ups and job creation, represents a multidisciplinary project able to council economic outcomes and peri-urban requalification, serving as a possible example in other similar peri-urban neglected areas.

2.2. Data Collection

OpenAgri project started in 2017, with its finish in 2020. For the environmental remediation of the fields and to promote farming activities, the project launched a public bid to assign arable lands and reward innovative activities in the area. The bid's scope was to select a group of start-ups with an agri-food focus to assign 35-ha to improve the area's requalification creating the first attempt of LAS. Fifty start-ups responded to the bid. The selection process evaluated fixed criteria, such as previous experiences and background, surface needs, and in-need categories.

Moreover, each participating start-up had to present a complete business plan to show the proposal's aims, scope, and sustainability. Rewarding points were possible demonstrating synergies between start-ups and proponents' age (to be under 40 years-old was considered a plus). Twenty-seven projects passed the first formal evaluation process, and eighteen were admitted to the fields' cultivation, with a further reduction to eight start-ups, due to merging of some realities and the quitting of some other subjects. These eight projects were the object of our study, reported in Table 2. Data relatively to each start-up were collected during 2019–2020, concurrently with the OpenAgri project. Sources of the data were the business plans presented during the bid. These documents provided us with a clear view of each start-up, clarifying goals and perspectives. This in-deep evaluation has been fundamental to assess and understand each involved project's

consistency, analysing the five years of development in the business plan. Another data source was a questionnaire (Appendix A) that we prepared and spread to the start-ups. The questionnaire's main goal was to have real-time feedback about the progress done and obtain further information on several aspects not investigated in the business plan. The questionnaire had three parts: (i) The economic dimension, asking the confirmation of what previously planned in the business plan and the employed workforce; (ii) the environmental aspects, in the light of the environmental particularities of the fields (a limitation in water availability) and related ES provided; (iii) the social dimension, to analyse start-up cooperation. Other researches investigate the relationship between ES and job opportunities with Pareto algorithm analysis [41]. These data were implemented into sustainability assessment tool as input. The indicators considered were the same for all the start-ups, with a distinction, since two of the eight start-ups do not use directly arable land (Figure 2) for their activities. Indeed, start-ups 1 produce spirulina algae in a water-based system, and start-up 3 commercialises flowers for the local retail market.

Table 2. List of start-ups working in the OpenAgri area and description of activities.

Number Start-Up	Activities and Target Market
Start-up 1	Spirulina algae production
Start-up 2	Agri-technologies for crops and vegetable production
Start-up 3	Flower bouquet production and retail
Start-up 4	Wheat cultivation for local bakers
Start-up 5	Snail production
Start-up 6	Seed production for local organic farmers
Start-up 7	Wildflowers and edible plants production
Start-up 8	Old cereal, hemp and Paulownia sp. Cultivation for the local market

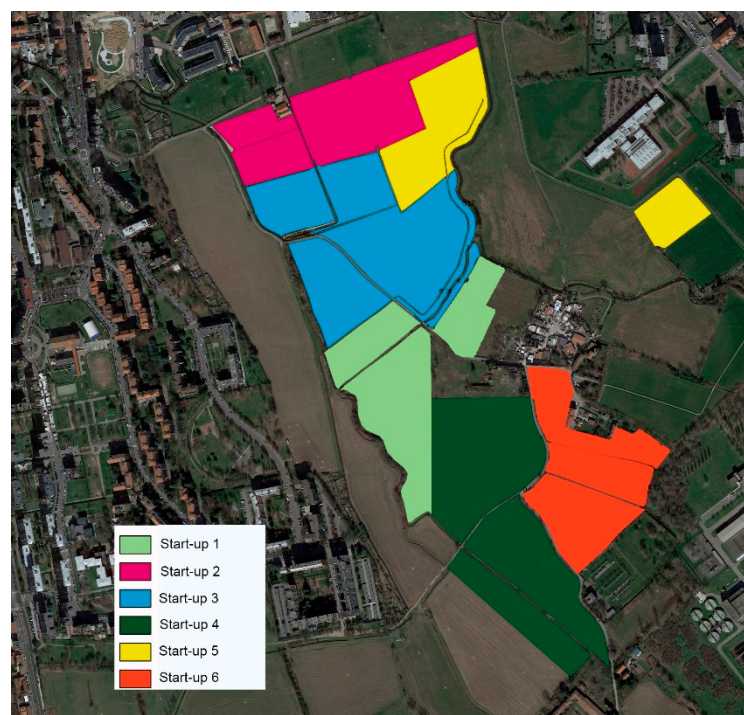


Figure 2. The sixth start-up divide in fields. Two start-ups (no. 1 and 3) do not directly cultivate fields, so they are not relevant on the map.

In addition, our active involvement in OpenAgri took us to participate in start-ups reunions, evaluating each project's progress compared to what described in the business plan presented at the beginning of the project.

2.3. SAFA Conceptualisation, Selection, and Application

The collected data and the derived database were used as input to conduct a sustainability assessment. Among the several frameworks available, we decided to use the Sustainability Assessment of Food and Agriculture systems (SAFA). This decision was due to several aspects considering literature research articles that used and supported the method [42–44] and compared it with others [45,46]. The SAFA framework has been developed by FAO, following a long path and delivering a robust and peer-reviewed methodology [47]. Moreover, differently from other similar systems, SAFA is not focused on the evaluation of a product—this approach would be close to a Life Cycle Assessment (LCA)—but on the overall evaluation of an enterprise, being adaptable to different contexts and size of evaluation. SAFA approach is thus focused on the enterprise and its role in the supply chain, not only with interest in environmental inputs and outputs, as it is typical in LCA, but also on governance and well-being components. The assessment depends on four categories of evaluation: (i) Good governance, (ii) environmental integrity, (iii) economic resilience, and (iv) social well-being (Figure 3).



Figure 3. According to the Sustainability Assessment of Food and Agriculture systems (SAFA) approach, sustainability assessment depends on these four categories of evaluation. Source: SAFA Guidelines.

Therefore, SAFA is a holistic framework for assessing a specific subject's sustainability in each aspect considered, thus representing a benchmark capable of assessing trade-offs and synergies between all sustainability faces [47]. The framework's organisation reflects the diverse sustainability dimensions, considering the four pillars' division (Figure 3) analysed, using 21 themes, 58 sub-themes, and 116 indicators (Figure 4).



Figure 4. SAFA structure and division into themes, sub-themes and indicators. Source: SAFA guideline.

The themes are related to 21 sustainability core issues. These themes focus on universal sustainability goals and encompass the four pillars previously described (Figure 3).

The themes used to design the sustainability path declines with sub-themes related to sustainability specific objective. SAFA sets 58 sub-themes, definable as an individual issue within SAFA themes. Indicators are measurable criteria to track sustainable performance for sub-themes and represent a standardised metric to guide sustainability assessment. For each indicator, SAFA sets the benchmark level, helping the user conduct the assessment and quickly understand if it is acceptable or below the needed level. Each indicator has an associated rating scale, from best to unacceptable. Each value is also associated with colour to quickly interpret the graphical result associated with each indicator's percentage scores during the analysis. Table 3 reassume the categories of performance associated with colours and percentage scores.

Table 3. Categories of performance associated with colours and percentage scores. Source information: SAFA Guidelines.

Performance	Colour	Percentage Scores
Best	Dark green	80–100%
Good	Light green	60–80%
Moderate	Yellow	40–60%
Limited	Orange	20–40%
Unacceptable	Red	0–20%

It is important to note that, in order to have a balanced evaluation, each indicator has a weight for each sub-theme level. In particular, each sub-theme has the same weight as well as each indicator within the sub-theme. That means that the weight is distributed equally between the indicators: If there are two indicators in a sub-theme, the mean must be one of the two scores, which have equal weight in the overall sub-theme score.

In our research, we decided to conduct the sustainability assessment on a tailored selection of the SAFA indicators. Out of the 116 available ones, we selected 69 indicators belonging to all four dimensions. This selection was due to the characteristics of OpenAgri project and its start-ups, which were suitable for some indicators, but not for others (e.g., some economic resilience indicators and social well-being are suitable for developing countries). The assessment's adaptability is a typical peculiarity of SAFA methodology compared to other frameworks, as reported in SAFA guidelines. It is possible to use part or total of the indicators in their default form or in an assessor's tailored made one.

The assessment is conducted through the SAFA Tool software, which is a free, open-source application developed by FAO to implement SAFA assessment via its guidelines. The software, user-friendly, drives the user during the assessment procedure in four consecutive steps: Mapping, contextualisation, indicators and reporting.

The analysed start-ups have a separate assessment, each describing a similar context—OpenAgri project—in which the enterprises are operating and then specifying each start-up's particular characteristics, using the information obtained from the business plans gained from the questionnaires.

Data quality is thus considered high by SAFA since data are primary and specifically collected. Therefore, SAFA can assign a different weight to each indicator depending on data availability, as is shown in Table 4. In our case study, the SAFA Tool assigned the maximum score—3 points—to each indicator.

If no data were available or the indicator was not considered suitable for our assessment, following SAFA guidelines, we used the “yellow grade”, thus indicating neutrality in that specific indicator and not influencing the overall assessment. The four separate steps lead to the Performance Report, a descriptive and analytic review of each analysed start-up's sustainability.

Table 4. Accuracy score depends on data reliability. Source information: SAFA Guidelines.

Data Quality per Indicator	Criteria	Accuracy Score
High-Quality Data	Is the data current? Maximum 1–2 years old.	3
	Is it primary data collected directly for SAFA?	
	Is its primary data from a previous third-party audit or sustainability framework?	
Moderate Quality Data	Is it primary data older than two years but considered still reliable?	2
	Is it secondary data?	
Low-Quality Data	Is it primary data older than five years?	1
	Are data estimations or proxy?	

3. Results

Each indicator’s score was reported (Appendix B) into Safa Tool software, which weighted the used indicators and gave us the following graphical results for each analysed start-up. The graphical results appear as a spider graph and bar chart giving the same information. In order to be more precise, we will show for each start-up the spider graph results.

- Start-up 1:

The first start-up produces spirulina, an alga used in the food industry. The production process involves a water-based industrial plan: Therefore, the start-up does not directly cultivate OpenAgri fields. This situation reveals the lower grades regarding soil, land, and biodiversity conservation, which the start-up does not primarily consider. Instead, the start-up shows the robustness of its business plan, with high grades in most of the indicators. Figure 5 shows SAFA results related to the start-up.

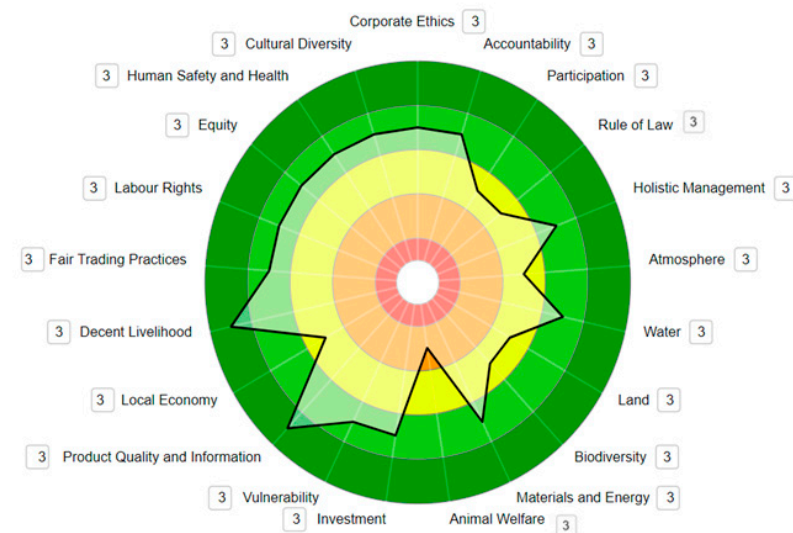


Figure 5. SAFA assessment result of the start-up as spider graph. The number near indicators suggest the data quality according to Table 4, and also, the colour in the circles represent the range score. As reported in Table 3, the colour means the performance score: Dark green: Best; light green: Good; yellow: Moderate; orange: Limited; red: Unacceptable. Low scores regarding soil indicators are due to the not-cultivation of land.

- Start-up 2:

The second start-up core business is twofold. Figure 6 shows SAFA results related to the activities. The cultivation of vegetables and horticultural products facilitates technological and sustainable production techniques in greenhouses. This technological approach results in good economic and management performances, while some environmental indicators—such as water usage and ecosystem connectivity—should be improved.

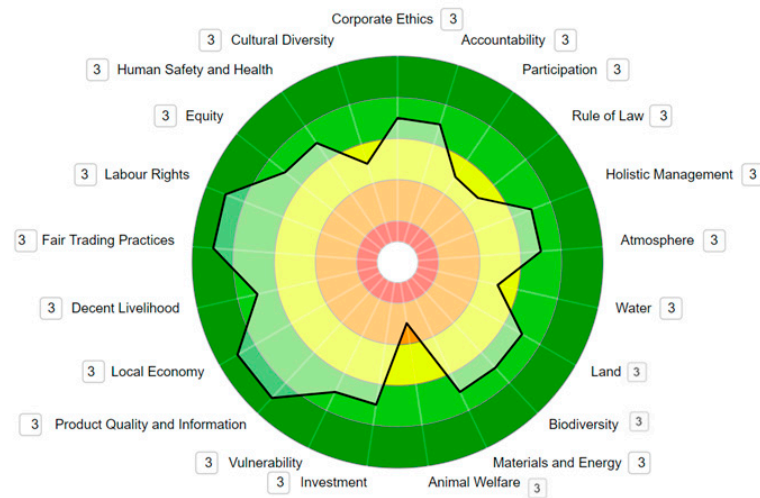


Figure 6. SAFA assessment result of the start-up as spider graph. The number near indicators suggest the data quality according to Table 4, and also, the colour in the circles represent the range score. As reported in Table 3, the colour means the performance score: Dark green: Best; light green: Good; yellow: Moderate; orange: Limited; red: Unacceptable. High scores in environmental and management indicators are due to the deep implementation of digital production tools.

- Start-up 3:

As the first start-up, this one is not directly cultivating the area. Instead, the start-up’s core business is to prepare and deliver wildflower bouquets, following one of the latest urban market trends. Therefore, environmental indicators received lower grades, even considering the dependence on foreign suppliers and the related footprint. A robust commercial approach and innovative business solution—bouquets flower as weekly service to subscribers—produce positive economic and management feedback, considering the gender equity shown by the enterprise, whose founders and leaders are women. Figure 7 shows SAFA results related to the activities

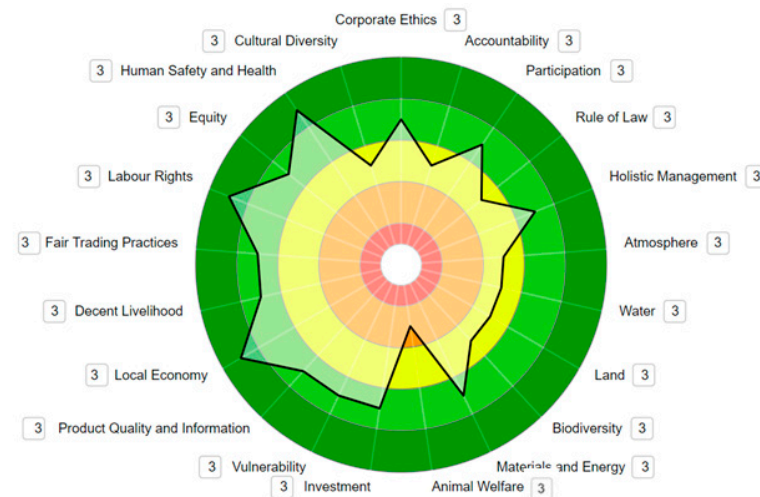


Figure 7. SAFA assessment result of the start-up as spider graph. The number near indicators suggest the data quality according to Table 4, and also, the colour in the circles represent the range score. As reported in Table 3, the colour means the performance score: Dark green: Best; light green: Good; yellow: Moderate; orange: Limited; red: Unacceptable. Yellow grades linked to soil indicators show the limited consideration of the topic, while green colour demonstrates the goodness of the management plan.

- Start-up 4:

The start-up mission is to innovate the bread supply chain. The start-up plans to create collaborations with local bakers and to introduce in OpenAgri fields social cultivation of cereal, followed by educational classes to learn bakery processes. The close relationship with local stakeholders generates positive feedback in local economic indicators, while other management aspects—e.g., accountability—seem to be neglected. Figure 8 shows SAFA results related to start-up activities.

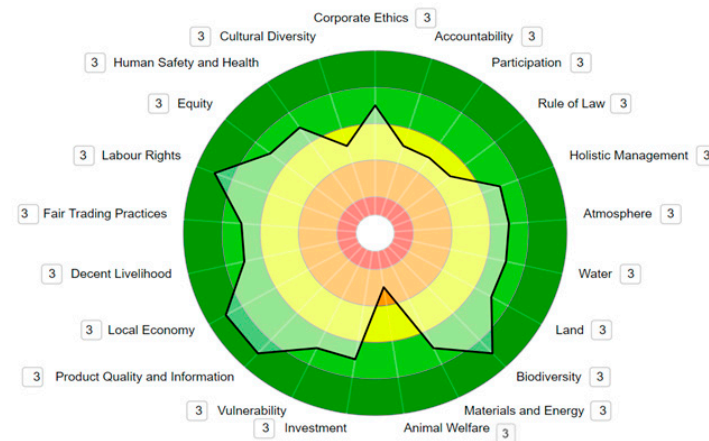


Figure 8. SAFA assessment result of the start-up as spider graph. The number near indicators suggest the data quality according to Table 4, and also, the colour in the circles represent the range score. As reported in Table 3, the colour means the performance score: Dark green: Best; light green: Good; yellow: Moderate; orange: Limited; red: Unacceptable. The implementation of old varieties leads to a high score in biodiversity indicators, and the involvement of local community fosters green colour related to local economy indicators.

- Start-up 5:

The start-up goal is to cultivate snail applying automatic processes and techniques. Figure 9 shows SAFA results related to start-up activities. Their overall positive environmental evaluation and good feedback regarding employment treatments since high automation levels result in raised workplace safety.

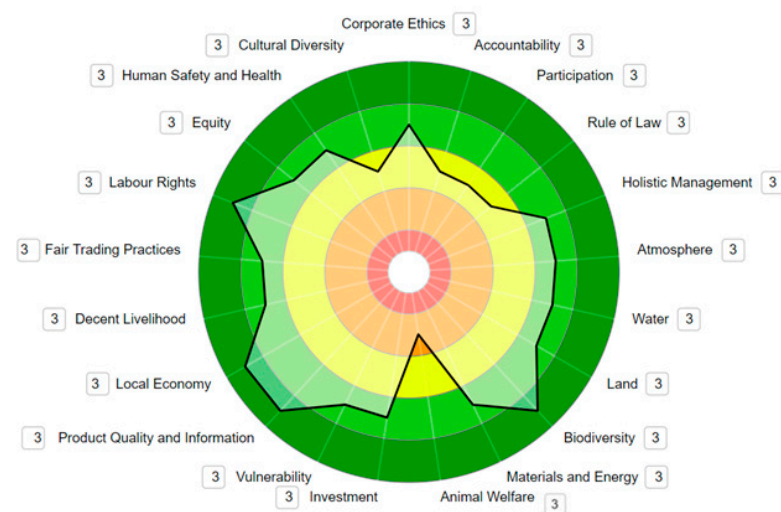


Figure 9. SAFA assessment result of the start-up as spider graph. The number near indicators suggest the data quality according to Table 4, and also, the colour in the circles represent the range score. As reported in Table 3, the colour means the performance score: Dark green: Best; light green: Good; yellow: Moderate; orange: Limited; red: Unacceptable.

- Start-up 6:

This start-up shows an overall high sustainability grade, as it emerges from Figure 10, showing SAFA results. Indeed, the start-up focused on organic cultivation and seed production for local farmers. That leads to the conservation and promotion of ancient cereal variety, a minimal environmental impact due to the absence of agrochemical inputs and the rigorous certification process.

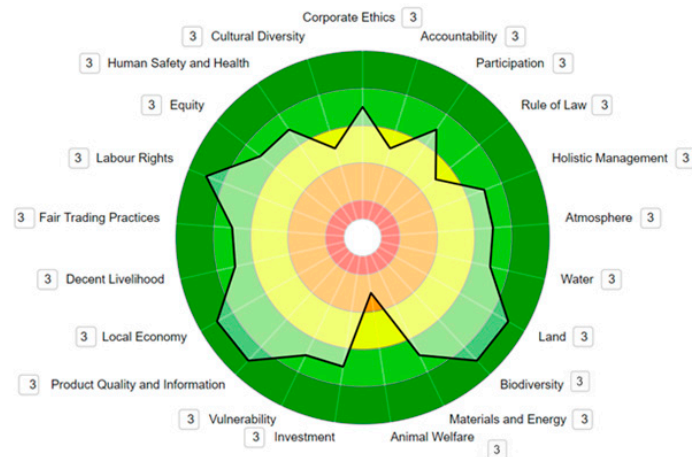


Figure 10. SAFA assessment result of the start-up as spider graph. The number near indicators suggest the data quality according to Table 4, and also, the colour in the circles represent the range score. As reported in Table 3, the colour means the performance score: Dark green: Best; light green: Good; yellow: Moderate; orange: Limited; red: Unacceptable. The organic management and involvement of local stake-holders generate high level of sustainability, with several green scores.

- Start-up 7:

The start-up focuses its activity on wildflowers production and edible plants cultivation. The business plan is solid and follows the increasing demands and trends of these goods in urban markets. Moreover, the start-up follows organic production management, reducing chemicals consumption and gaining an overall positive assessment. Figure 11 shows SAFA results related to start-up activities.

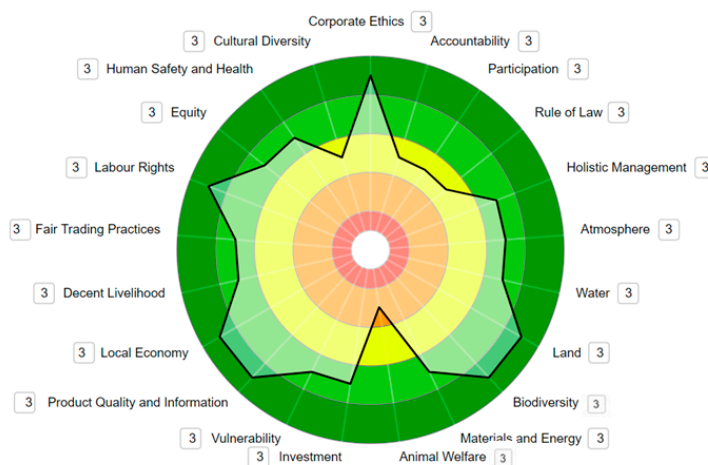


Figure 11. SAFA assessment result of the start-up as spider graph. The number near indicators suggest the data quality according to Table 4, and also, the colour in the circles represent the range score. As reported in Table 3, the colour means the performance score: Dark green: Best; light green: Good; yellow: Moderate; orange: Limited; red: Unacceptable. The presented business plan resulted in overall high scores linked to environmental and management indicators, while limited scores were obtained regarding social participation and stakeholder involvement.

- Start-up 8:

The last start-up has as core business the production of ancient varieties of cereal and the cultivation of Canapa as a fibre source. Moreover, collaborating with a Peruvian non-profit organisation, the start-up aims at testing the cultivation of exotic species, such as Quinoa (*Chenopodium quinoa*) and Canahua (*Chenopodium pallidicaule*) well-known for their nutritional values. These goals cause marked results in environmental indicators, as well as good performances in corporate ethics. Figure 12 shows SAFA results related to start-up activities.

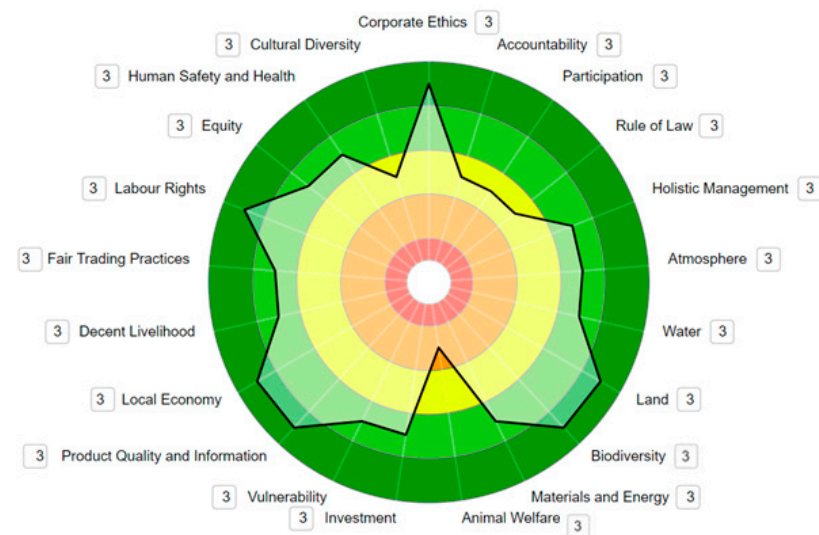


Figure 12. SAFA assessment result of the start-up as spider graph. The number near indicators suggest the data quality according to Table 4, and also, the colour in the circles represent the range score. As reported in Table 3, the colour means the performance score: Dark green: Best; light green: Good; yellow: Moderate; orange: Limited; red: Unacceptable. Like other start-ups, the implementation of various species leads to a high score in environmental indicators, here even higher due to the introduction of exotic species valuable to the local market.

4. Discussion

The assessment revealed each start-up's peculiar characteristics, underlining strengths and weaknesses in their path to reach sustainability. Moreover, the overall process helped understand the SAFA approach: The framework, which till now has mainly used in developing countries [48–53], confirmed its wide and known adaptability since it leaves a high grade of freedom to the assessor, that is in charge of selecting the indicators, the related questions, replies and final scores. However, this openness revealed as a double-edged sword: The assessor's subjectivity may cause misjudgements or not homogeneous grades, especially in contexts where there are no fixed benchmarks useful for grade calibration. In our case study—a peri-urban area in a developed country subjected to requalification supported by European funds—the risk of a subjective assessment was reduced applying the rigid structure of the Italian legislative context and the OpenAgri project rules: Indeed, the availability of detailed documents and business plans was fundamental to avoid possible partial scores.

All the evaluated start-ups demonstrated a high sustainability level in all four pillars—environmental, economic, social, and governance. However, several key points emerged. First of all, all the enterprises contribute to requalify a dismissed area, employing people and assuring a net land gain and ES provision. This stated fact significantly contributes to the positive evaluation of the start-ups. As stated by [41,54], the OpenAgri start-ups have a robust multifunctional approach that maximises job creation and ES provision.

Nevertheless, the overall project is at a new-born stage and, consequently, the start-ups. Some internal policies and rules are not present and codified yet; others—such as

environmental certifications and management structures—are typical of more structured realities and therefore not suitable for the case study. Despite these lacks in defining the internal policies, all the start-ups manage to improve the environmental, social and economic tissue in which they work. These considerations led to positive scores in several indicators, according to the Table 3 criteria, especially in environmental sub-theme, assigning “light green” grade, since the maximum score level “dark green” is associated with entities that conjugate practical experience with written policies.

These considerations are valid for the economical and good governance pillars too: Indeed, the start-ups have no clear and stated written policies or regulations regarding financial risks or governance audit; despite this lack, they are anyhow respecting principles in the practices, e.g., stipulating voluntary insurances and involving local stakeholders. Regarding stakeholder involvement and relations, we considered each start-up as a stakeholder to the others, meaning that the enterprises more open to collaboration (e.g., start-up 3) received a higher evaluation in the related indicators. Whereas, it emerged that for some indicators, the start-ups should improve their performances: e.g., they lack transparency and communications, since the only means used is the social media, with no impartial control on the released information.

Regarding the assessment of social aspects, it is essential to highlight that, being the evaluation conducted on a European project carried out in Italy, most of the indicators received a high grade since all the start-ups are fully compliant with national laws. Indeed, in developed countries, it is stated and clear that no child labour or any illegal workforce should be present: These indicators may be more helpful in developing countries with minor restrictions in the workforce. Other examples can regard the health indicators: Operating in a country where healthcare is mainly public and almost free, healthcare access indicators saw the highest grade to all the enterprise. However, because of this healthcare availability, the start-ups did not evaluate as essential the need for further private healthcare assistance for their employees, therefore receiving low evaluation in the related indicator.

It is also noticeable that, in a developed context, only a few of the start-ups have a gender equality policy and reality: Out of the eight enterprises, only start-up n.3 is founded and managed by women, while start-up n.6 has two women as cofounders. Nevertheless, it should anyhow highlighted the social role of the start-ups: Acting in a context where unemployment rates and NEETs are increasing, OpenAgri follows its motto “new skills for new jobs”, hosting the start-ups in an attempt at territorial requalification: Observants to this, the start-ups employ local vulnerable people, as youngsters and foreigners, actively contributing to the socio-economic improvement.

Other essential considerations emerged analysing the SAFA environmental indicators considered. Out of the eight start-ups, two have as core business agricultural processes that do not involve open field cultivation: Start-up 1 focuses on spirulina production, which occurs in a water-based implant, while start-up n.3 is trading flower bouquets. The remaining six enterprises cultivate the 35-ha fields, mainly following organic management for the assessment that let us considers soil indicators only for these six start-ups. The different indicators considered did not affect each start-up’s overall evaluation. The comparison between values and results obtained could be possible between the start-up with the same kind of activities. For example, soil indicator results are comparable only between start-ups that directly cultivate lands.

Moreover, between the group of six, start-ups n.6 and n.8 obtained high scores because they declared the cultivation of old varieties of cereals and implemented a net of trees and shrubs in the fields, linking their fields to rural areas nearby, boosting the ES provision. Since no start-up raises animal, related indicators are not present in the analysis.

Overall, using SAFA indicators, the OpenAgri project can be evaluated as a positive sustainability framework for a peri-urban area’s requalification. With its grades, the resulting assessment is not a final judgment report. It is an evaluation—and even self-evaluation—tool to have a real-time benchmark to improve or change enterprises strategies.

In this view, start-ups should focus their attention on their organisation's peculiar aspects to grow as enterprises. Since all of them have an overall positive impact on the local environment and economy, they should communicate their activities better, implementing certified standards of the already done operations (e.g., ISO UNI norms) to acquire a more structured and aware role in the agri-food market. Further researches may include different evaluation frameworks and tools to underline different aspects and widen sustainability assessments and their correlation with agri-food entrepreneurship projects.

5. Conclusions

The study shows that entrepreneurship and peri-urban agriculture could foster economic and environmental aspects, bringing sustainable development in neglected areas in our cities' fringe zone—the research analyses a case study located in Milan. The eight agri-food start-ups cultivate peri-urban fields, contributing to forming Local Agrifood Systems (LASs) and improving the socio-economic tissue according to the EU needs, linking local production and its perceived properties (e.g., ecologically sustainable, healthy, traditional, protection of biodiversity) [37]. This research demonstrates the implementation of a LAS and its contribution to the birth of a potential local agri-food start-ups hub, with the effect of developing new job opportunities.

According to the study's objective, eight start-ups' sustainability level verifies their compliance with an international framework. The start-ups' evaluation applying the SAFA framework guarantees adaptability and a holistic approach for assessing sustainability in a different context, e.g., the start-up included associations and enterprises that are very different in terms of internal structure. Indeed, the strong added value of SAFA is the consideration of the four different pillars that compose sustainability—good governance, economic resilience, environmental integrity and social well-being. The framework's application shows that, overall, the start-ups have a high sustainability level, helping to recover a neglected area and respecting the local environment. Moreover, using SAFA results for the start-up could help them show the sustainability of their efforts and activities [50–53] and also recent literature uses SAFA to compare the sustainability of certified and non-certified realities [55]. Therefore, SAFA results show that the involved start-ups should implement a more structured management, with the definition of detailed written internal policies to codify what the start-ups already do in practices. At a higher level, the study demonstrates that peri-urban requalification could link together peri-urban agriculture, social issues and entrepreneurship, resulting in positive environmental, social, and economic aspects in the path to peri-urban sustainability.

Author Contributions: Conceptualization, A.Z., S.B.; methodology, A.Z., V.V., R.S.; software, A.Z.; validation, S.B.; investigation, A.Z., R.S.; data curation, A.Z.; writing—original draft preparation, A.Z.; writing, review and editing, V.V., S.B.; supervision, S.B. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Acknowledgments: The authors are thankful to OpenAgri project partners for the information and the data provided to conduct the present study. The questionnaire (Appendix A) was developed with Federico Andreotti. The authors acknowledge support from the University of Milan through the APC initiative.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A



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Start-up: _____

(1) What economic value do you aim to obtain from production?

_____ €/year

(2) How many people do you think will be employed in your business?

___ 1–3 people ___ 3–6 people ___ 6–10 people ___ more than 10 people

(3) Do you foresee, in addition to the main crop, other productions or secondary income?

___ Yes ___ No

If so, what percentage of secondary income compared to primary production?

___ 0–10% ___ 10–30% ___ 30–50%

(4) How much water do you foresee needing?

___ m³/day

(5) Have you thought about cultivating species/cultivars with minor water needs?

___ Yes ___ No

(6) What type of irrigation do you plan to choose?

___ submersion ___ sprinkling ___ drip irrigation ___ subirrigation ___ no irrigation

(7) Do you plan to follow an organic management plan?

___ Yes ___ No

(8) How deep do you plan to conduct soil tillage:

___ 0–15 cm ___ 15–30 cm ___ 30–50 cm

(9) Have you thought about choosing species/cultivar less sensible to wind damage?

___ Yes ___ No

(11) Do you think the presence of hedges and rows as windbreaks is essential for your production?

___ Yes ___ No

(12) Which species/cultivar will you cultivate?

Trees:

Horticultural species:

Forage:

Others:

(13) Do you plan to use agrochemicals? If so, how much will you spend?

___ Yes ___ No Budget (€)/year: _____ €

(14) Will you adopt biological control techniques? (e.g., pheromone traps, antagonistic insects...)

___ Yes ___ No Techniques and budget (€)/year: _____ €

(15) Which start-ups of the OpenAgri project do you collaborate with? What kind of relationship or exchange do you have? (e.g., ideas/information; common workforce and equipment; budget and resources...)

Start-up 1

Start-up 2

Start-up 3

Start-up 3

Start-up 4

(16) Do you plan to organise education or training activities? If so, what percentage will these activities contribute to the total revenue?

___ Yes ___ No ___ 0–10% ___ 10–30% ___ 30–50%

Thank you for your time!

Appendix B

Themes	Sub-Themes	Default Indicators	St 1	St 2	St 3	St 4	St 5	St 6	St 7	St 8
C1 Investment	C1.1 Internal Investment	C1.1.1 Internal Investment								
	C1.3 Long Ranging Investment	C1.3.1 Long Term Profitability								
		C1.3.2 Business Plan								
	C1.4 Profitability	C1.4.1 Net Income								
C2 Vulnerability	C2.1 Stability of Production	C1.4.2 Cost of Production								
		C1.4.3 Price Determination								
		C2.1.2 Product Diversification								
	C2.5 Risk Management	C2.5.1 Risk Management								
C3 Product Quality and Information	C3.1 Food Safety	C3.1.1 Control Measures								
		C3.1.2 Hazardous Pesticides								
	C3.2 Food quality	C3.1.3 Food contamination								
		C3.2.1 Food quality								
	C3.3 Product Information	C3.3.1 Product Labelling								
C3.3.2 Traceability System										
C3.3.3 Certified Production										
C4 Local Economy	C4.1 Value Creation	C4.1.1 Regional Workforce								
		C4.1.2 Fiscal Commitment								
	C4.2 Local Procurement	C4.2.1 Local Procurement								

Themes	Sub-Themes	Default Indicators	St 1	St 2	St 3	St 4	St 5	St 6	St 7	St 8
S1 Decent Livelihood	S1.1 Quality of Life	S1.1.1 Right to Quality of Life								
		S1.1.2 Wage Level								
	S1.3 Fair Access to Means Of Production	S1.3.1 Fair Access to Means of Production								
S2 Fair Trading Practices	S2.1 Responsible Buyers	S2.1.1 Fair Pricing and Transparent Contracts								
	S2.2 Rights of Suppliers	S2.2.1 Rights of Suppliers								
S3 Labour Rights	S3.1 Employment Relations	S3.1.1. Employment Relations								
	S3.2 Forced Labour	S3.2.1 Forced Labour								
	S3.3 Child Labour	S3.3.1 Child Labour								
	S3.4 Freedom of Association and Right to Bargaining	S3.4.1 Freedom of Association and Right to Bargaining								
S4 Equity	S4.1 Non Discrimination	S4.1.1 Non Discrimination								
	S4.2 Gender Equality	S4.2.1 Gender Equality								
	S4.3 Support to Vulnerable People	S4.3.1 Support to Vulnerable People								
S5 Human Safety and Health	S5.1 Workplace Safety and Health Provisions	S5.1.1 Safety and Health Training								
		S5.1.2 Safety of Workplace, Operations and Facilities								
	S5.1.3 Health Coverage and Access to Medical care									
S5.2 Public Health	S5.2.1 Public Health									

Themes	Sub-Themes	Default Indicators	St 1	St 2	St 3	St 4	St 5	St 6	St 7	St 8
G1 Corporate Ethics	G1.1 Mission Statement	G1.1.1 Mission Explicitness								
		G1.1.2 Mission Driven								
G2 Accountability	G1.2 Due Diligence	G1.2.1 Due Diligence								
	G2.1 Holistic Audits	G2.1.1 Holistic Audits								
	G2.2 Responsibility	G2.2.1 Responsibility								
G3 Participation	G2.3 Transparency	G2.3.1 Transparency								
		G3.1 Stakeholder Dialogue	G3.1.2 Stakeholder Engagement							
G5 Holistic Management	G5.2 Full-Cost Accounting	G5.2.1 Full-Cost Accounting								

Themes	Sub-Themes	Default Indicators	St 1	St 2	St 3	St 4	St 5	St 6	St 7	St 8
E1 Atmosphere	E1.1 Greenhouse Gases	E1.1.1 GHG Reduction Target								
		E1.1.2 GHG Mitigation Practices								
		E1.1.3 GHG Balance								
E1 Atmosphere	E1.2 Air Quality	E1.2.2 Air Pollution Prevention Practices *								
		E2.1 Water Withdrawal								
E2 Water	E2.2 Water Quality	E2.1.2 Water Conservation Practices								
		E2.2.2 Water Pollution Prevention Practices *								
E3 Land	E3.1 Soil Quality	E3.1.1 Soil Improvement Practices								
		E3.1.2 Soil Physical Structure								
		E3.1.3 Soil Chemical Quality								
		E3.1.4 Soil Biological Quality								
		E3.1.5 Soil Organic Matter *								
	E3.2 Land Degradation	E3.2.2 Land Conservation and Rehabilitation Practices								
E4 Biodiversity	E4.1 Ecosystem Diversity	E4.1.2 Ecosystem Enhancing Practices								
		E4.1.4 Ecosystem Connectivity *								
		E4.1.5 Land Use and Land Cover Change								
	E4.2 Species Diversity	E4.2.1 Species Conservation Target								
		E4.2.2 Species Conservation Practices								
E4 Biodiversity	E4.3 Genetic Diversity	E4.2.3 Diversity and Abundance of Key Species								
		E4.2.4 Diversity of Production								
		E4.3.1 Wild Genetic Diversity Enhancing Practices								
		E4.3.2 Agro-biodiversity in-situ Conservation								
		E4.3.3 Locally Adapted Varieties and Breeds								
E5 Materials and Energy	E5.2 Energy Use	E4.3.4 Genetic Diversity in Wild Species								
		E4.3.5 Saving of Seeds and Breeds								
		E5.2.3 Energy Consumption								
		E5.2.4 Renewable Energy								

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