



NOVASOIL

INNOVATIVE BUSINESS MODELS FOR SOIL HEALTH

Grant agreement ID: 101091268

PIL Flora (Italy)



Project Consortium

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1 Background, focal question and needs

This case study (CS) aims to **analyse the environmental and financial benefits of converting conventional cropping systems** based on annual cereal crops to organic cropping systems based on perennial aromatic crops in a hilly environment.

It focuses on **profiting from data on soil fertility and health, crop yield and quality, agri-environmental aspects, and landscape valorisation collected at the farm level**, deriving from the introduction of perennial medicinal and aromatic crops and the transition from conventional to organic agricultural models.

It investigates the possibility of **developing business models** pivoting on soil fertility conservation (SOM increase) and the impact on other ecosystem services (e.g., sustaining farm biodiversity and resilience, reducing reliance on external inputs). The case study directly entails the dimension of the value chain.

The CS derives from an integrated supply chain project funded in the framework of the EU's Rural Development Policy, which involved research centres, private companies, farmers, and public administrations in driving force of rural sustainable development through new cropping systems and management innovations in the internal and hilly areas of the Tuscany Region (central Italy). These marginal areas are characterised by conventional extensive agriculture, little agricultural value, and various environmental and socio-economic constraints, which negatively affect crop productivity and quality and lead to very low farmer income. The main critical issues in these areas include soil erosion, nutrient leaching, reduced carbon (C) in soils, and decreased biodiversity and ecosystem service provision. The fundamental concept of this CS is to redesign the existing farming systems by introducing perennial medicinal and aromatic crops with the conversion from conventional to organic agricultural models to maximise soil fertility and health, productivity, resilience and landscape valorisation. At the farm level, soil fertility, crop yield and quality are regularly evaluated from the beginning to the end of the project. At the same time, the change in the cultivation systems has allowed the development of new supply chains based on medicinal and aromatic plants, with a high added value of final products, supporting the territorial multifunctional development through the integration processes between agriculture, processing and other economic activities.

The significant **environmental challenges** the CS addresses are loss of soil organic matter (SOM), soil erosion, GHG emissions, water/soil/air pollution and extreme weather conditions (extreme rainfall, floods, and drought). The agriculture model proposed in the CS targets increasing SOM, reducing soil erosion and reducing reliance on tillage and external inputs (mineral fertilisers, pesticides). Increasing soil organic matter means increasing soil structure, water retention and infiltration (reducing drought and flooding risks), improving nutrient cycling and boosting biological processes (detoxification included). Reducing the intensity of soil tillage and the reliance on environmentally hazardous agrochemicals can also reduce direct and



indirect GHG emissions and water/air/soil pollution. Altogether, these benefits increase agricultural productivity and the resilience and enhancement of the landscape in the target regions.

The main **barrier** is overcoming the challenges associated with environmental and socio-economic constraints in the internal and hilly areas, such as limited access to resources, lack of infrastructure, and low market demand. Therefore, these areas' sustainability must equally support the area's territorial multifunctional development by integrating agriculture, processing, and other economic activities. Another barrier is the underdeveloped collaboration and coordination among research centres, private companies, farmers, and public administrations involved in an integrated supply chain. It is also vital to support farmers in adopting and implementing the new cropping systems, management innovations, and access to funding to facilitate redesigning farming systems.

The CS **contribution** is a better understanding of the socio-economic implications of adopting new cultivation systems, management innovations and innovative integrated supply chains. This could include profitability, resource efficiency, and market demand for organic herbal products. Moreover, the knowledge learned from the case study can help evaluate the efficiency of the actions undertaken in improving soil fertility, provision of ecosystem services, increased productivity and resilience of the agroecosystem, and landscape valorisation, representing valuable data for policymakers.

2 Policy mix

Table 1 Key elements of national **policy mix and institutional framework around soils**, based on and adapted from Rogge and Reichardt, 2016; Williamson, 2000.

Domains	Elements to consider	Description	Lickert (1-5)	
			P ¹	Q ²
O.Awareness and understanding	Definition of soil health	The soil health in the CS is associated with (and defined through) the following qualities: high organic matter (no less than 1% of the mass) and mineral content, the ability to absorb and retain water, and the ability to produce crops with zero	4	2

¹ P=priority. Please rank accordingly to 5 point-Likert scale based on how these elements are currently considered in your case study: 1 no priority; 2 low priority; 3 neutral; 4 moderate priority 5 high priority

² Q=quality. Please rank accordingly to 5 point-Likert scale based on the current quality of the political process in your case study: 1 very poor -2 poor; 3 acceptable; 4 good 5 very good



		dependence on chemical fertilisers and pesticides.		
1. Policy concern	Soils as policy priority	Similarly, as in the Italy 3 CS: “CiRAA LTEs on conventional and organic agriculture” (further in the text as “Italy 3 CS”), soil health became, from the perspective of the involved stakeholders, the political priority only recently and has been addressed via policies initially targeting other issues: food security, organic farming regulations, etc. The current attention is more focused on soil's ability to absorb and store CO ₂ , and policies with the potential to directly affect soil health are exclusively associated with using fertilisers and pesticides. Furthermore, the soil itself is currently not a primary focus of policymakers since different issues, such as climate change and war impacts on food and economic security, have overshadowed it.	4	2
2. Policy agenda on soils	Political commitment towards soil health, non-binding targets	The central non-binding policies aimed at soil health now seem related to the CAP. In addition to specific measures to encourage good agricultural practices, eco-schemes represent a new element in this programming as they have a more or less direct effect on soil health.	4	3
3. Institutional environment	Binding national regulations on soil	The central binding soil-related policies concerning this CS are related to the Common Agricultural Policy (CAP). However, these are too wide and can include many topics, from pollution and biodiversity to the directives and regulations of the current agricultural practices. Finally, some of the specific regulations are linked to certifications of the agriculture practises and land within areas linked to European and Italian designation marks (PDO, PGI, TSG) since these guarantee better soil management. Also, the organic farming regulations (no tillage) are crucial for this CS.	4	2
4. Policy integration	Interactions between and	The agricultural, industrial, and urban sectors are directly linked to soil health. These sectors are interconnected when	5	3



	within policy sectors	<p>implementing political land-use decisions and regulations, indirectly (and often sadly negatively) impacting soil health. An excellent example is the new urban-rural housing and infrastructure development and the associated policy steps. Since these are still not commonly grounded in sustainable land management patterns, they burden the landscape and the human communities (especially the farmers) with additional threats and costs (e.g., poorly managed waste management, extensive land use leading to the decrease of landscape resilience against the climate change impacts events: land floods, droughts, and landslides).</p> <p>To ensure soil health, the agricultural and environmental sectors should be involved in the decision-making processes concerning land use. Even urban planning can negatively impact the state of soil (e.g., by polluting it).</p>		
5.Governance structures	Levels of governance involved, roles and functions	<p>The levels of governance involved are national, regional and local. At the national level, we are talking about the CAPs. The regional level marks the political power of the different regions, which varies across Italy. Concerning this CS, we are talking about Tuscany, which has relatively solid regional political power.</p> <p>Another critical factor (on the local level) is the municipality, which has varying power over the decision-making process concerning land management depending on its connection to the regional centres (e.g., Florence or Pisa). This means a legislative obstacle in ensuring soil health's security because the funds's flows allocated to certain localities are based on the regional and administrative affiliation rather than the real-time needs of the afflicted area.</p>	4	3
6.Contracts	Property rights enforcement, land tenure agreements	<p>The key land tenure agreements regarding the CS concern land ownership, especially rural landscape development or rural-urban planning and new infrastructure creation. Also, leasing land to farmers or promoting sustainable tourism by providing funds are enrolled. Similarly, as in</p>	4	3



		<p>the Italy 3 CS: “CiRAA LTEs, other important contract-related issues are related to any certifications of the agriculture practised and land falling within areas linked to Italian designation marks (DOP, IGP, TSG, since on average, these aspects are reflected in better soil management. Some supply chain contracts provide for specific cultivation standards reflected in the soil's health.</p> <p>International customers also impose production standards for medicinal plants. These standards consider several aspects, including respect for soil fertility.</p> <p>Some are pushing for the adoption of sustainable techniques such as regenerative agriculture.</p>		
7.Validation and coherence	Mechanisms in place to measure impacts and ensure compliance to targets and limits	<p>Concerning the CS, there are two leading environmental indicators crucially linked to soil health monitoring:</p> <p>The quality of soil organic matter and the severity of water soil erosion are binding for CAP monitoring. As for the others, the situation is more complicated, and for example, ensuring the monitoring of environmental indicators (e.g., biodiversity) is challenging to obtain or non-existent (e.g., no-tilt or less mechanical soil management impacts monitoring tools).</p>	5	3
8.Non-governmental actors	Role of different actors and multi-stakeholder coordination	<p>In the CS, the key stakeholders are the direct and indirect land users: farmers, tourists, and locals are the direct land users and policymakers and consumers are the indirect ones.</p> <p>Farmers are directly linked to land and responsible for its specific management. In their praxis, they react to policies implemented by policymakers, market demands, and consumers' expectations and demands. In this way, consumers have particular power over how the product has been created and managed (e.g., consumers who prefer organic products can push the market and policymakers to implement more organic farming-friendly incentives). Tourists are another type of direct land user that has power over the</p>	4	3



		<p>state of the land. In the case of Flora, they travel to see the lavender fields. They are interested in the quality of production, which often means they pay attention to the environmental and agricultural responsibility of the farming process and the final product. Another type of direct land user is the locals. These live in the landscape and use it (e.g., walks), can impact the landscape's future look (e.g., by building new houses and infrastructure) or decide to conserve the land and take care of it (e.g., by cooperating with local farmers and leasing the land and further promoting organic farming techniques).</p> <p>Similarly to Italy 3 CS, the contractors working on farms and providing pillaging (and other) services are crucial for the farm's successful management. Finally, policymakers and farmer's trade associations guide individual farmers regarding incentives and technical advice. Policymakers are the last (but not least) stakeholders, having significant power over all the soil-linked processes since they plan, create, and implement incentives linked to soil and land management in general.</p>		
9.Allocation of resources and sources of finance	Available budget for soil health and blended finance	Similarly, as in the case of the Italy 3 CS, the essential funds allocated to promote soil health are currently associated with the CAPs (the schemes to promote pollinators, organic farming promotion and sustainable tourism promotion funds). However, we do not have the specific numbers indicating the amount of allocated money.	3	3
10.Policy consistency with soil health	Synergies and trade-offs between policy sectors and towards soil ES	The most addressed soil ES were those linked to soil's provision of food and biomass, as well as its ability to store water and carbon. Finally, the soil was perceived as a platform for cultural activities. In this way, stakeholders perceived soil health as having undisputable importance but at the same time being not equally addressed, managed and protected by current policy settings and existing incentives. The agricultural and market sectors should work hand in hand to ensure the soil's	4	3



		health. Yet, the market´s demands (on national and European levels) often push for more significant monetary gain and production, promoting unsustainable (and harmful) soil management practices. On the other hand, synergies occur in the case of farmers aiming to transition towards organic agriculture and customers demanding ethical and sustainable products. In this case, the additional barrier is often the unprepared (and overcomplicated) Italian bureaucracy, creating challenges rather than opportunities.		
11.Contextual factors	Enabling and disabling conditions	<p>One of the main disabling conditions is the lack of policies directly addressing soil health and the diversity of the existing policies that require farmers to be skilled in agriculture knowledge and regarding the old and new policies and incentives. The second most disabling condition is the trade-off between extensive market demands and the disproportionate pressure on soil concerning unsustainable agricultural practices.</p> <p>The enabling conditions are the will of farmers and customers to promote organic farming practices and create more ethical and soil-friendly products.</p>	5	3

3 Policy directionality

Aim of this section is to assess how existing instruments (regulatory and economic) put in place by the national policy mix are able to support business models for soil health. Policy instruments constitute the concrete tools to achieve overarching objectives and are usually associated with specific goals, i.e. the intended effect of instruments on the medium-long term. Furthermore, policy narrative are defined as the key words and concepts that express the political understanding of a problem, i.e. soil health.

3.1 Instruments

Table 3 Assessment of **policy instruments** (adapted from Rogge and Reichardt, 2016)



PRIMARY TYPE	PURPOSE TYPE		
	Supply	Demand pull	Systemic
Economic instruments	RD&D* grants and loans, tax incentives, state equity assistance	Subsidies, feed-in tariffs, trading systems, taxes, levies, deposit-refund-systems, public procurement, export credit guarantees	Tax and subsidy reforms, infrastructure provision, cooperative RD&D grants
Regulations	Patent law, property rights; land tenure;	Technology/performance labels and standards, prohibition of products/practices, application constraints; public procurement	Market design, grid access guarantee, priority feed-in, environmental liability law Information
Information	Professional training and qualification, entrepreneurship training, vocational training, advisory	labelling programs, public information campaigns; consumers organizations	Education system, thematic meetings, public debates, cooperative programs, clusters

PRIMARY TYPE	PURPOSE TYPE		
	Supply	Demand pull	Systemic
Economic instruments	Direct payments for the promotion of pollinators and soil health certification standards.	High European standards for biodiversity promotion and the demand for ethical and soil-friendly products. Facilities and infrastructure that enable sustainable tourism patterns.	CAP incentives for sustainable and soil health-promoting agricultural practices and products. Sustainable tourism infrastructure and directives.
Regulations	Non-binding but restrictive regulations on soil-impacting practices are not allowed if one wants to access	For pollinators promotion, herbicides are prohibited, and the area must not be shredded during the pollinating period.	Firstly, eco-schemes support farmers who adopt or maintain farming practices that contribute to EU



	<p>the economic incentive.</p>	<p>For the soil health certification standard, using soil management methods that would degrade biodiversity value is prohibited. For sustainable tourism patterns, the regulated number of tourists and sustainable land use patterns (e.g., eco or sustainable farm tourism) alongside careful use of landscape that does not endanger the biodiversity and soil quality (e.g., waste pollution) are required.</p>	<p>environmental and climate goals, such as promoting pollinators. Secondly, the biodiversity alliance aims to ensure the biological quality of soil through certification standards by promoting sustainable and more conscious and ethical agricultural practices. Finally, the Sustainable Tourism Fund seeks to change unsustainable tourism patterns by funding new infrastructure and means to protect the landscape (and soil) by introducing sustainable and landscape-friendly touristic patterns.</p>
<p>Information</p>	<p>Education concerning pollinators promotion and soil health certification standards. Education focused on raising awareness concerning sustainable tourism patterns.</p>	<p>Public information campaigns and events.</p>	<p>Workshops, farmer markets, commented tours, and tourist events that promote more sustainable and conscious landscape use.</p>



Description*

1) Eco Scheme 5- Specific measures for pollinators

This instrument targets farmers. It implements EU objectives to promote biodiversity and food security: preventing biodiversity loss, improving ecosystem services and preserving habitats and landscapes, producing healthy and nutritious food sustainably, and improving the numbers and variability of insects.

It is based on the obligation of means (pollinator-friendly land management). The financial contribution is lost in the event of non-compliance with the incentive provisions. This instrument indirectly impacts soil health.

2) Soil health certification standards

This instrument targets farmers. It implements several EU objectives directly focusing on soil health: promoting the biological quality of soil and efficient management of natural resources such as water, soil, and air, including reducing chemical dependency.

It is based on the obligation of means. In the event of non-compliance with the provisions of the incentive, the financial contribution is lost. This instrument directly impacts soil health.

3) European Charter for Sustainable Tourism and Sustainable Tourism Fund

This instrument targets farmers, locals and the public. It implements several EU objectives: preventing biodiversity loss, soil and landscape protection, promoting sustainable development and efficient management of natural resources such as water, soil and air.

It is based on the obligation of results. If the incentive provisions are not followed, the financial contribution is lost. This instrument indirectly impacts soil health.



3.2 Policy narrative

Table 3 Description of the policy narrative (based on Lehmann et al, 2020)

<p>Policy narrative (and scale of action)</p>	<p>This case study derives from an integrated supply chain project funded in the framework of the EU's Rural Development Policy. The project involved research centres, private companies, farmers, and public administrations driving rural sustainable development through new cropping systems and management innovations. The project's key concept was to redesign the existing farming systems by introducing perennial medicinal and aromatic crops and converting from conventional to organic agricultural models. At the same time, new supply chains based on organic aromatic plants, with a high added value of final products, have been developed, supporting the territorial multifunctional development of the area through the integration processes between agriculture, processing and other economic activities.</p> <p>Therefore, CS operates on all scales: globally, it aspires to contribute to organic and more sustainable soil management techniques and create standards defining ethical and soil-friendly products, further strengthening and promoting soil health. Nationally and regionally, it introduces sustainable ways to manage the soil, fields, and landscape in relation to the introduction of sustainable tourism patterns. Locally, it aspires to develop the area in coordination with sustainable tourism principles and rural development. The involved stakeholders are transnational and national and regional policymakers, alongside international and national tourists, international and local farmers and local communities. The CS addresses all three soil narratives: soil fertility (by introducing and applying organic farming principles), soil health and security (by promoting sustainable land management oriented toward biodiversity protection and promotion), and implementation of sustainable land management practices.</p>
<p>Policies and incentives in place</p>	<ul style="list-style-type: none"> • Eco Scheme 5- Specific measures for pollinators • Soil health certification standards • European Charter for Sustainable Tourism and Sustainable Tourism Fund
<p>Land tenure and contracts</p>	<p>This case study aims to analyse the environmental and financial benefits of converting conventional crop systems into organic and perennial systems based on medicinal and aromatic crops. Flora s.r.l. is a private import and export company.</p>
<p>Management strategies applied</p>	<ol style="list-style-type: none"> 1) Implement conservation agriculture techniques, such as reduced or no tillage and cover crops, to improve soil fertility and reduce soil erosion. 2) Implementing soil-friendly farming techniques to improve soil fertility (above all organic matter content and biological activity), reduce pollution risks linked to agrochemical use and preserve biodiversity.



	<p>3) Implement careful landscape management techniques to promote pollinators, such as no shredding during the pollinating period.</p> <p>4) Implementing sustainable land use management by introducing and implementing sustainable tourism principles (e.g., by distributing numbers of tourists over the whole year, enhancing waste management in the area).</p>
Soil functions interested	Fertility, water and nutrition storage and reservoir, biodiversity promotion, carbon storage reservoir, soil as a platform for cultural activities.
Ecosystem services addressed	<ul style="list-style-type: none">• Water storage, filtration and nutrient cycling• Promotion of biodiversity• Carbon reservoir (C sink)• Landscape complexity• Food supply and biomass production• Physical platform and cultural services for people

4 Mapping exercise

4.1 Synthesis of the value mapping

Aim of the value mapping is to understand level of awareness of and purpose towards soil health as framed by the business model (Barth et al, 2015).

Looking at the business model, please describe the following elements:

a. Value proposition

- **What are the causes of degradation?**

The causes of soil degradation are intensive agricultural practices and the impacts of climate change. Another variable contributing to soil erosion is that the CS is in a hilly Tuscan area, a type of landscape that is more prone to water erosion if combined with unsustainable land management practices.

- **What are the socio-technical solutions proposed (BM)?**

- 1) Introducing perennial medicinal and aromatic crops and transitioning from conventional to organic agricultural models to improve soil fertility, health, productivity, and landscape valorisation (e.g., environmental tourism).
- 2) Developing innovative agronomic management practices focusing on soil health conservation and sustainable crop production.
- 3) Creating an integrated supply chain for organic, conservative, agroecological farming + multifunctional development.

- **Why do soils matter in the BM?**



The soil matters in this BM for this CS since it is a crucial element of 1) crop growth and 2) a healthy landscape that attracts many tourists to the CS site each year to observe the lavender fields.

b. Value creation and delivery

• **What soil ES are targeted by the business model? (list based on soil strategy)**

- Water storage, filtration and nutrient cycling,
- Promotion of biodiversity,
- Carbon reservoir (C sink),
- Landscape complexity,
- Food supply and biomass production,
- Physical platform and cultural services for people.

• **What soil ES are not provided / neglected?**

- Source of raw materials,
- Geological, geomorphological and archaeological heritage archive.

• **Public/private - who can benefit from that values?**

Both the public and private sectors benefit from the values provided by BM. The CS offers products to markets, so both sectors are involved (either as customers or the various businesses that cooperate). Furthermore, the tourist sector is vital to this CS since many tourists visit it yearly for its unique lavender fields.

• **What trade-offs emerge? Are the causes addressed?**

The transition towards more sustainable land management practices (such as the pollinators promotion or the soil health certification standards) could potentially raise the costs for farmers since they mean additional monetary investments (e.g., weed management) combined with different land management patterns that might be problematic (e.g., no shredding in the pollinating period with the need for weed management could be difficult). The current incentives do not address these additional costs and the need to adapt to new land management practices. The trade-off is, therefore, straightforward: Currently, there is a weak integration of measures towards greater biodiversity or organic farming (and the healthy landscape) promotion that would also address the needs of individual farmers, as well as more individual and local requirements that can vary from farm to farm (e.g., the different need for land management for dairy versus vegetable farm). In the case of CS, there is also a tension between the market demands that promote unsustainable practices that, however, mean greater production and more sustainable land management practices that might be more costly and less profitable for the farmer. Finally, consumers often desire a good quality and ethical product but sometimes fail to understand that with quality and greater farmer's input into this product, the product's price will rise as well. Many, however, are not keen to buy it afterwards, perceiving it as "too pricy". In the case of CS, there are farmer markets and events (e.g., famous lavender festival) that have the potential to not only sell products but also educate customers and disseminate knowledge concerning healthy soil and healthy



landscapes in general. Supporting sustainable tourism is also promising since the site is well-known and visited. In this way, it is possible that in the future, the CS will contribute to “bringing up” the conscious and ethical tourists and customers that will further promote sustainable land use patterns but also push policymakers to support farmers and production chains to be more responsible and soil-friendly.

c. Value capture

- **What soil ES are targeted by the incentives?**

- **Incentive 1.** Eco-Scheme 5: Pollinators promotion:
 1. Water storage, filtration and nutrient cycling,
 2. Promotion of biodiversity,
 3. Food supply and biomass production,
 4. Source of raw materials.
- **Incentive 2.** Soil health certification standards:
 1. Water storage, filtration and nutrient cycling,
 2. Promotion of biodiversity,
 3. Carbon reservoir,
 4. Food supply and biomass production,
 5. Source of raw materials.
- **Incentive 3.** European Charter for Sustainable Tourism:
 1. Provide a physical platform and cultural services for humans.
- How is value distributed along the stakeholders?
 - Water storage, filtration and nutrient cycling: reflected on by farmers;
 - Provide food and biomass production: reflected on by farmers;
 - Promotion of biodiversity: reflected on by farmers and locals;
 - Carbon storage and physical platform and cultural services for people: reflected on by farmers and policy-makers;
 - Provide a physical platform and cultural services for humans: reflected on by farmers and locals.
- Where do the resources come from (public/private)?

Regarding the public sector resources, the CS derives from an integrated supply chain project funded in the framework of the EU's Rural Development Policy 2014-2020—Tuscany Region, Submeasure 16.2—Support for pilot and cooperation projects. As for the private ones, we know there are some but the stakeholders did not specify these.
- How is soil health described and framed by the business model? (place in the picture)
 - BM: Redesigning the existing farming systems by introducing perennial medicinal and aromatic crops with



the conversion from conventional to organic agricultural models.

- Essential soil ES within this BM are water storage, filtration, nutrient cycling, biodiversity promotion, raw material sources, and the platform for cultural services. Soil that disposes of these is considered healthy.
- This is also linked to the global, national, regional, and local levels by introducing sustainable land management patterns and more soil-friendly products and practices (both in farming practices or the landscape “use” by tourists). Also, the CS targets global, national, and regional markets (both in the products they export and the tourists they attract). Still, it also has strong regional (Tuscany) and local (Santa Luce) impacts concerning landscape management, the creation of new infrastructure, and the inflow of tourists.

4.2 Solution mapping synthesis

- a. What innovations and changes are we looking for?
 1. Finding a way to balance the distribution of income and value to the territory. Flora is gaining lots of money for its own business and company. Still, there is also a need to be more beneficial for and contribute to the sustainable development of the whole locality.
 2. Diversification of crops: in general, it is essential to introduce more crop species. This would provide the area with more resilience against crop failure.
- b. What regulatory and policy conditions would we need?
 - I. Certification of products,
 - II. Adding extra value to the soil.
 - What regulations (binding or not) and resources (new incentives) are needed?

There is a need for more economic incentives to promote the sustainable development of the farm site and the locality (e.g., new facilities, building of new infrastructure or creation of better public services).

- Are there some contradictions between tools and/or policies?
 - Current incentive settings do not adequately address the farmers´ real needs (e.g., they sometimes support practices that are done only to obtain financial support) and also lack the integration of the farmers´ perspective of their daily reality and individual requirements.
 - Similarly, as in the case of the second UNIFI CS, more region-specific incentives, not in terms of administration but in terms of geographic area, would bind new areas based on the



characteristics of the regions and the environmental and agricultural needs of specific localities.

- What could be the effect of the soil monitoring law?

We don't have any available data considering this question. However, the problem that inevitably comes to mind is that soil health monitoring will be based on physical, chemical and biological parameters. Even though these are objective and evidence-based, the human dimension (which is also essential) is somehow missing. This could mean that incentives requiring certain states of soil could also disproportionately impact farmers by, on the one hand, implementing more strictly soil-friendly measures but at the same time not providing them with the means how to achieve this without additional costs that are not addressed.

- What contractual solutions and terms and what kind of guarantees are needed for business model implementation? (e.g. certification)

Similarly, as in the second UNIPI CS, better and more effective cooperation among all the actors involved within the supply chain is needed. Stakeholders perceived the certification as a possible way to promote the creation of more soil-friendly and ethical products (which are often demanded by consumers), which will also have their place within the supermarkets and market stores (therefore, the certification would make practical sense and impact since the product will be possible to employ). The role of markets is vital also concerning the product's price, so it reflects its actual input cost. But to link the fair price of the product on the site of the farmer and the consumer, there needs to be an information campaign or events that will involve consumers and inform them of the process of creation of the product and the agricultural reality so they understand why some products are pricy when also delivering required quality. Furthermore, policymakers need to be involved to ensure that there is enough additional funding and support for farmers to help them balance the risks linked to transitioning to more sustainable practices. Here, markets again play their role in ensuring that there will be more rational and organic-friendly demand, so the push on "the more gain, the better no matter the means" will no longer be promoted concerning agricultural production and related practices (e.g., intensive agricultural land management practices to promote rich harvest no matter the cost).

- c. What resources could facilitate the change?

- Implement conservation agriculture techniques to improve soil fertility and reduce soil erosion.
- Promotion of sustainable development and sustainable tourism patterns.
- The availability of funding and support for farmers when transitioning towards more sustainable land management practices.
- Information campaigns and events to inform the public about product creation.



4.3 Pathways mapping

- CHANGES: what is needed in terms of regulations and institutions; social habits; products and technologies, services and infrastructure?

1. Finding the way Flora can contribute to the sustainable development of the whole locality: bringing more money not just to the company but to enhancing the quality of living and opportunities for local people;
2. Becoming a producer and a farmer at the same time: ensure better interconnection between the various stages of product processing and sale: not buy and resell the product but also be the one who grows it;
3. Integrating the story of Flora's products: telling people more about them and the history and story of their products;
4. Diversification: bringing more diverse crops into the locality to protect the soil.

- TRENDS/DRIVERS: what is the influence of the social, economical and environmental context?

1. Competition between countries inside and outside the EU is significant. One example of this problem is the EU's trade agreements with countries offering low prices for agricultural products. These agreements can lead to economic advantages and unfavourable competition for Italian producers. This dynamic can negatively affect sustainable Italian production and lead to unfair competition. This driver can significantly impact agricultural and trade policies, prompting a review of strategies to protect local producers who apply sustainable agricultural practices primarily. For example, suppose the company is a supply chain and does not produce the product directly (the product is produced for it); the competition for the best (and at the same time, cheapest) product that the company buys from producers means that producers out of Tuscany get involved. The Tuscany farmers often get underpaid because they can't compete with the price of, for example, African products.

In this case, the solution would be a better interconnection between the producers (farmers) and the company, or, in the best case, the company itself should be the producer.

- ACTIVITIES/RESOURCES: what skills, knowledge, and partners are needed?

1. Better interconnection of all the stakeholders involved in the supply chain and the process of product creation (policymakers, farmers, locals, tourists, consumers);
2. External investors that would be interested in sustainable rural development of the locality;



3. Economic resources promoting the information campaign and events;
4. Economic resources support and secure farmers during the transition towards sustainability.

Table 4 Pathways mapping

	Short term (up to 3 years)	Medium (3 - 7 years)	Long term (after 7 years)
INNOVATIONS			
Regulations and binding policies	Simplification of Italian bureaucracy.	Soil health certification.	n.a.
Incentive instruments	n.a.	Need for more systemic incentives.	Long-term incentives for sustainable agricultural practices and soil management.
Contractual solutions	Fair long-term supply agreements between farmers and buyers.	n.a.	Contracts that support sustainable practices and protect farmers' interests in the long term. Certifications to ensure sustainable agricultural practices.
Infrastructure	New facilities and infrastructure for sustainable development of the local area.	n.a.	n.a.
Product	Certified plant products.	n.a.	n.a.
Services	Advisory services for the adoption of sustainable practices.	Economical support for sustainable measures.	Integrated services for local producers.
Technology	n.a.	Advanced technologies for	n.a.



		soil monitoring and management.	
Institutions	n.a.	n.a.	n.a.
Actors' configuration	Development of collaboration networks between actors in the agricultural supply chain.	n.a.	n.a.
Coordination mechanisms and partnerships	Platforms for farmers to learn and disseminate knowledge.	Public-private partnerships to support sustainable practices.	n.a.
RESOURCES			
skills, knowledge, R&D	Promotion of farmers' knowledge regarding organic farming possibilities, including funding and possible support resources.	n.a.	Long-term support for farmers' access to all the required knowledge and skills resources.
DRIVERS: social habits, economic, environmental	Impacts of trade policies on sustainable agriculture. Competition between countries inside and outside the EU and the need for protection of local producers.	Change in social habits. Awareness of the importance of ethical and soil-friendly products and advancing knowledge of their actual price.	Adapting to the dynamics of global competition and protecting local producers.

5 References

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