



NOVASOIL

INNOVATIVE BUSINESS MODELS FOR SOIL HEALTH

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Digital Showcase ZSA



Project Consortium

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1 Background, focal question and needs

The "Digital Showcase for Soil-Friendly Agricultural Practices" case study addresses the pressing question: How to guarantee the economic vitality of rural areas and provide farmers with access to data, knowledge, and incentives for agricultural practices that sustain soil health? In the face of growing environmental challenges, such as soil degradation, climate change, and the economic fragility of rural communities, this innovative business model seeks to bridge the gap between sustainable farming practices and economic sustainability.

Agriculture, particularly in rural areas, is at the forefront of both economic and environmental concerns. Traditional ploughing, a common practice in agriculture, has been identified as a significant contributor to soil degradation, leading to issues such as increased erosion, nutrient leaching, loss of organic matter, reduced soil fertility and increased CO₂ emissions. These environmental and climate impacts are compounded by the socioeconomic challenges faced by rural communities, where agriculture is often a cornerstone of the local economy. The economic vitality of these areas is closely tied to the health of their soils, making sustainable agricultural practices not just an environmental necessity, but also an economic imperative.

The case study proposes the creation of a digital map, a "Digital Showcase," which serves as an interactive platform where agricultural fields managed with climate-friendly tillage practices are highlighted. These practices include direct seeding, strip tilling, and minimal or reduced tillage using harrows and cultivators. The aim is to use this digital platform to raise public awareness and create a societal demand for more fields to be cultivated using these sustainable methods. By making these practices visible and accessible to a broader audience, the showcase can drive a shift towards more environmentally responsible farming.

However, the success of this business model hinges on addressing several critical needs. First, farmers require access to the appropriate machinery and technology to implement reduced tillage practices. The initial cost of acquiring such equipment can be prohibitive, especially for small-scale farmers in rural areas. Financial support, subsidies, or cooperative ownership models could be necessary to make this technology accessible.

Second, the adoption of new agricultural practices necessitates a shift in knowledge and skills. Farmers must be equipped with the necessary technical knowledge and training to successfully transition to and maintain these practices. Ongoing support, perhaps through extension services or digital knowledge platforms, will be crucial in this regard.

Third, the digital infrastructure itself must be robust and accessible. For the digital showcase to be effective, it requires reliable internet access in rural areas and a user-friendly platform that can be navigated by all stakeholders, including those with limited digital literacy. Ensuring that the platform is inclusive and easy to use will maximize its reach and impact.

Lastly, policy support and incentives are vital. Government policies that promote sustainable farming practices through subsidies, tax incentives, or certification schemes can provide the necessary encouragement for farmers to adopt and sustain these practices. Without such support, the economic



risks associated with transitioning to new methods may outweigh the perceived benefits for many farmers.

In conclusion, the "Digital Showcase for Soil-Friendly Agricultural Practices" offers a promising solution to the dual challenges of environmental degradation and economic sustainability in rural areas. By leveraging digital technology to highlight and promote climate-friendly farming practices, this business model not only contributes to soil health but also supports the economic vitality of rural communities. The focal question—how to guarantee economic vitality while providing farmers access to essential data, knowledge, and incentives—can be addressed through a combination of technological support, education, infrastructure development, and targeted policy measures. With these elements in place, the digital showcase has the potential to serve as a powerful tool in the broader effort to promote sustainable agriculture and ensure the long-term health of both the environment and rural economies.

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
0.Awareness and understanding	Definition of soil health	While all respondents recognized the importance of soil health, there was a divergence of views on its urgency in Latvia. Ministry officials and scientists identified specific challenges, such as insufficient soil organic matter and sub-optimal pH, emphasizing the need for action. Farmers, while acknowledging some issues, considered them manageable. Others lacked knowledge to make definite claims on whether soil health is an issue on national level. The definition of healthy soil also varied among respondents. Scientists, advisors, and farmers primarily focused on optimal levels of soil agrochemical properties. State	5	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



		and municipal officials emphasized broader soil functions, such as water filtration and nutrient cycling. Other respondents offered more simplified definitions, often linking soil health to its ability to produce abundant food.		
1.Policy concern	Soils as policy priority	There was a clear consensus among respondents that soil health is a critical policy priority at the national level. Farmers and state officials, in particular, emphasized its extreme importance. The commitment to soil health was evident in both public and private sector. Public investments, particularly in support schemes for soil-friendly practices, were mentioned by state and municipal officials.	4	3
2.Policy agenda on soils	Political commitment towards soil health, non-binding targets	While many respondents were unaware of specific non-binding strategies for soil health at the national or regional level, they generally believed that such strategies existed. Some respondents recalled a previous national development plan that aimed to reduce the overall area of degraded or abandoned farmland in Latvia. However, state officials and farmers demonstrated more knowledge of specific targets related to soil health. These targets included areas under reduced tillage, precision technologies, green manure, catch crops, and buffer strips. This suggests a growing focus on implementing practical measures to improve soil health in Latvia.	4	4
3.Institutional environment	Binding national regulations on soil	While there are few national binding targets specifically focused on soil health, numerous binding policies are in place to protect and improve soil quality. These policies include restrictions on fertilizer use in nitrate-vulnerable zones, requirements for soil cover during winter and on slopes to prevent erosion, and prohibitions on annual cultivation of organic soils. These measures are implemented through national legislation, which farmers must comply with to be eligible for certain area-based payments. The policy sectors involved in these initiatives primarily include the Ministry of Agriculture, the Ministry of Climate, and the Ministry of	3	3



		Environment, with significant input from non-governmental organizations		
4.Policy integration	Interactions between and within policy sectors	Despite the importance of soil health, there is a concerning lack of cooperation between different policy sectors in Latvia. Agricultural, environmental protection, and economic policy sectors often operate in silos, hindering efforts to find comprehensive solutions to soil health issues. While discussions have taken place on strategies like transitioning to reduced tillage to increase soil organic matter, these approaches can conflict with other targets, such as reducing the use of plant protection products. This highlights the need for a more integrated and coordinated approach to address soil health challenges.	2	2
5.Governance structures	Levels of governance involved, roles and functions	The primary responsibility for promoting soil-healthy practices lies at the ministerial level. Ministries are responsible for drafting and implementing specific policy regulations. While state controlling agencies may delegate certain functions to their regional branches, municipal authorities have limited involvement, primarily focused on property tax measures for abandoned or degraded land.	4	3
6.Contracts	Property rights enforcement, land tenure agreements	Most contractual arrangements between land owners and state authorities are voluntary and involve exchanging support for implementing soil-friendly practices. Additionally, voluntary agreements between landowners and cooperatives or private businesses are common, particularly in the form of carbon credit schemes. The only mandatory contractual obligation is basic land maintenance to avoid land degradation and associated property tax increases.	4	4
7.Validation and coherence	Mechanisms in place to measure impacts and ensure compliance to targets and limits	The validation of soil health objectives involves a collaborative effort between state actors and private landowners. Farmers are required to conduct regular soil analysis, typically every 5 years in nitrate-vulnerable zones and every 7 years in other regions. State authorities monitor these results and are also responsible for monitoring water quality, soil pollution, and	2	3



		other environmental factors that may impact soil health. However, the current system lacks targeted soil health monitoring and effective inter-ministerial collaboration.		
8.Non-governmental actors	Role of different actors and multi-stakeholder coordination	While governmental actors play a crucial role in soil health initiatives, a range of other stakeholders are also actively involved. Landowners and farmers, the forestry sector, environmental protection NGOs, and universities are particularly active in this area. Local authorities and other parts of civil society are less engaged. Collaboration among stakeholders is primarily facilitated through working parties and advisory boards convened by the Ministry of Agriculture and the Ministry of Environment. However, cooperation between the environmental sector and landowners remains a challenge. Strengthening these relationships is essential for effective soil health management.	3	2
9.Allocation of resources and sources of finance	Available budget for soil health and blended finance	Respondents were generally aware of substantial funding dedicated to soil health improvement measures, primarily derived from the European Common Agricultural Policy. Latvia has allocated over 100 million euros to eco-schemes targeting reduced tillage, catch crops, and crop diversification. Additional funding is available for machinery investments and reforestation efforts. While land users are likely aware of these resources, their specific knowledge and utilization may vary.	5	4
10.Policy consistency with soil health	Synergies and trade-offs between policy sectors and towards soil ES	While soil health policies in Latvia demonstrate a good coherence with various ecosystem services, the full potential of these benefits has not yet been realized. While food, biomass, and raw material production are increasing, there is still significant room for improvement. The potential of soil as a carbon reservoir is also being explored, with a steady increase in organic matter content. Cultural services are well-integrated, with widespread public access to private land for activities like camping, mushroom picking, and sightseeing. Environmental aspects are	5	3



		also addressed through measures such as buffer strips, non-productive features, and protected areas. However, further efforts are needed to fully optimize soil health and maximize its contribution to ecosystem services in Latvia. This may involve enhancing policy implementation, promoting sustainable land management practices, and investing in research and innovation to unlock the full potential of healthy soils.		
II.Contextual factors	Enabling and disabling conditions	A critical challenge in implementing soil health policies is increasing societal awareness of the vital ecosystem services provided by soil. Many people overlook the importance of soil, assuming its benefits are always available. While private landowner interest and external funding have been enabling factors, several challenges persist. Insufficient financing can hinder the implementation of soil health measures, particularly for landowners with limited resources. The development of innovative business models that integrate soil health practices into agricultural production is also essential, but can be challenging. Moreover, the lack of stakeholder involvement, particularly among those with limited knowledge of soil and soil health, can hinder progress. To effectively implement soil health policies, Latvia must address these challenges and leverage the enabling factors. This includes raising public awareness, increasing access to financing, promoting innovative business models, and fostering greater stakeholder engagement. By doing so, it is possible to create a more sustainable and resilient agricultural landscape that benefits both farmers and society as a whole		

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 eco-scheme payment for reduced soil tillage practices	Rising carbon trading markets, Carbon Removal Certification Framework (CRCF)	Investment in cooperative R&D grants,
Regulations	National legislation - ban of soil ploughing in certain areas		National legislation increasing property tax for



			degraded farmland
Information	Support for knowledge transfer through CAP network advisory services	Product and practice branding campaign financing under CAP Rural Development	
Description*	<p>Ecoscheme “Reduced soil tillage practices”:</p> <ul style="list-style-type: none"> • Arable farmers are the target of this instrument • This instrument serves to implement EU objectives in regards to GHG emission reduction, Soil organic matter increase, PPP reduction, soil erosion reduction • This instrument is based on means • In case of non-compliance the applicant gets refused the hectare-based support • This instrument is directly linked to target soil health <p>National legislation – ban of soil ploughing in certain areas</p> <ul style="list-style-type: none"> • Target of this instrument is a farmer with arable land or permanent grasslands • This instrument serves to implement EU objective in GHG emission reduction and maintenance of soil organic matter • This instrument is based on obligation of result • Sanctions in the event of non-compliance is reduction of overall direct payments (3% to 10%) • This instrument targets soil health directly <p>Knowledge transfer support under CAP network advisory services:</p> <ul style="list-style-type: none"> • Target of this instrument is any farmer. This instrument is managed with advisory agencies as middle manager. • This instrument doesn’t directly serve to implement EU objectives (other than knowledge transfer), but can be used to educate land owners about soil-friendly practices • This instrument is based on means. • There are no sanctions if land owners do not use this instrument • Indirectly, this instrument targets soil health, especially if there are knowledge transfer which can be regarded to soil health improvement <p>CRCF carbon removal framework:</p> <ul style="list-style-type: none"> • Target of this instrument is any private or state actor that is willing to build a carbon credit certification procedure in order to trade carbon credits 		



- This instrument does indirectly implement certain EU objectives such as carbon sinking.
- This instrument is based on obligations of result
- If carbon trading actors would not comply with common certification framework, it could potentially lead to being excluded from carbon markets
- This framework indirectly targets soil health

Investment in cooperative and R&D grants:

- Target of this instrument is cooperatives, scientific institutions, end users and NGOs
- This instrument does not directly serve to implement an EU objective, but depending on research result, it could.
- This instrument is based on obligation of result
- Sanctions in case of non-compliance of rules could result in request to pay back the grant
- This instrument does not directly target soil health, but it could in case if research is aimed at increasing soil health

National legislation increasing property tax for degraded farmland

- Target of this instrument are land owners
- This instrument does not directly serve an EU objective, but it does reduce the amount of degraded land
- This instrument is based on obligation of result
- In case the legislation is not followed, the land owner receives a doubled property tax
- This instrument directly targets soil health

Product and practice branding campaigns

- Targets of this instrument are producers' organisations, NGOs, Cooperatives and processors.
- This instrument does not serve to directly implement EU objectives
- This instrument is based on obligation of result
- In event of non-compliance, the recipient would not receive a co-financing for product or practice branding campaigns
- This instrument does not directly target soil health, but it could in case of soil-health related product or soil health friendly practice campaign.

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>Sustainable soil management is essential, encompassing the protection of soil health and habitats as well as the productive, economically beneficial use of land. While soil health is critically important, it has historically received insufficient political attention. Fortunately, many national strategies and legislative measures are now being developed to address this issue. Additionally, the European Union has intensified its focus on soil health, allocating significant economic resources to voluntary initiatives that promote soil-friendly agricultural practices. Our particular case study, which focuses on soil health improvement through digital mapping of reduced tillage practices, would significantly benefit and accelerate these current initiatives by providing a practical tool to enhance awareness, adoption, and monitoring of sustainable practices. This digital approach aligns with the broader efforts to develop a functional national-level soil health strategy, helping to ensure that soils are managed in a way that supports both environmental sustainability and economic development. These strategies are developed on a national level, with regionalization primarily occurring among territories within and outside nitrate vulnerable zones.</p>
<p>Policies and incentives in place</p>	<ol style="list-style-type: none"> 1) Common Agricultural Policy Strategic Plan of Latvia <ul style="list-style-type: none"> • Eco scheme 4 “Reduced soil tillage” • Investment in material assets “investment in climate friendly soil tillage machinery” • Advisory services • New enhanced conditionality 2) National legislation on integrated crop growing <ul style="list-style-type: none"> • Mandatory soil analysis every 5 or 7 years • Maximum fertilization rates that cannot be exceeded • Crop rotation requirement
<p>Land tenure and contracts</p>	<p>Although mandatory land tenure agreements or contracts specifically supporting this case study are not in place, voluntary programs do exist, offering financial incentives for farmers who adopt reduced tillage practices on designated parcels. Furthermore, under EU co-financing arrangements for the acquisition of reduced tillage machinery, recipients are obligated to apply these practices on a stipulated percentage of their arable land for a minimum duration of five years, thereby ensuring sustained commitment to soil conservation efforts.</p>
<p>Management strategies applied</p>	<p>All existing policies and incentives are administered by national authorities, including the Ministry of Agriculture and its associated agencies. Landowners retain the discretion to participate in voluntary support schemes. Applications for these schemes are submitted by the end of</p>



	May, after which farmers implement the necessary practices. Approval is typically granted by the end of October, contingent upon meeting all specified criteria. For reduced soil tillage programs, participants are additionally required to upload photographic evidence of their parcels post-tillage to verify compliance with the established requirements to the controlling agencies.
Soil functions interested	Carbon sequestration mainly, Primary production secondly
Ecosystem services addressed	Biodiversity, Climate control, Economic viability, Plant production,

4 Mapping exercise

4.1 Synthesis of the value mapping

a. Value proposition (look at pentagonal problem)

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

Insufficient Nutrient Levels: The depletion of essential nutrients, particularly potassium (K₂O) and phosphorus (P₂O₅), is a significant contributor to soil degradation. This decline is primarily driven by fertilization rates that are inadequately low relative to the biomass produced, leading to a progressive reduction in soil fertility.

Low Organic Matter Content: The content of organic matter in soils remains critically low. The slow rate of increase can be attributed to the limited adoption of sustainable agricultural practices, such as reduced tillage, green manuring, the use of cover crops, and the application of organic fertilizers. Additionally, the comparatively low crop yields, and consequently low crop residue returns, relative to the EU average, further exacerbate the issue.

Soil Acidification: Soil acidification is an ongoing challenge, largely due to the natural tendencies of the prevalent soil types in Latvia. Regular liming is recognized as the most effective countermeasure, yet the adoption of soil liming practices among landowners is occurring at a suboptimal rate.

While there was a consensus among the participants regarding the factors contributing to soil degradation, the majority expressed that soil health in Latvia is gradually improving rather than declining. However, the primary



concern remains that the pace of this improvement is insufficient to meet long-term sustainability goals.

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

The core of the proposed business model is the creation of a digital showcase map that highlights fields where farmers have adopted reduced tillage practices. This digital platform aims to increase social awareness by visually demonstrating sustainable agricultural practices, thereby fostering a greater demand for environmentally friendly farming methods. The map will serve as a public-facing tool to educate communities and stakeholders about the benefits of soil-friendly practices, encouraging both transparency and accountability in agricultural sustainability.

In addition to raising awareness, another potential future opportunity of the business model anticipates the establishment of local community soil health funds to support farmers during the transition to reduced tillage. These funds would help mitigate potential financial burdens and income losses associated with adopting these practices. By offering targeted financial assistance, the business model seeks to facilitate the broader adoption of sustainable farming methods, contributing to long-term agricultural and environmental health.

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

In this business model, soils are of critical importance due to the extensive range of ecosystem services they provide, such as nutrient cycling, water filtration, and carbon sequestration. By raising public awareness and fostering demand for soil-friendly practices, the model seeks to ensure the long-term health and sustainability of soils. This, in turn, helps to safeguard the essential ecosystem services that soils offer, preventing their degradation and ensuring their continued availability for future generations.

b. Value creation and delivery

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

This particular business model directly targets Biodiversity, Climate control, Economic viability, and Plant production ecosystem services, but it is important to underline that also other ecosystem services are tackled indirectly.

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

In the context of this business model, the primary emphasis is not placed on ecosystem services related to water quality, recreation, culture, and human health. However, it is important to note that these services are not entirely neglected; rather, they are addressed indirectly through the implementation of soil-friendly practices. While the model primarily targets soil health and its immediate ecosystem functions, the broader benefits to other ecosystem services are still inherently supported, albeit not as a direct focus.



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

The values generated by this business model contribute to both private and public goods. On the private side, landowners stand to benefit in the long term from enhanced soil health, which in turn improves soil fertility and leads to higher biomass and crop yields. Immediate and direct private gains are also realized through various financial mechanisms, such as eco-scheme support, contributions from local community funds, and other financial instruments. At a broader scale, public benefits are derived from the ecosystem services supported by this model, including more affordable food production, reduced greenhouse gas emissions, diminished water pollution, and increased soil biodiversity. These public gains enhance overall environmental quality and contribute to the well-being of the wider community.

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

Several short-term trade-offs are associated with the adoption of reduced soil tillage practices. These include an initial reduction in crop yields, the financial burden of investing in reduced tillage machinery, and a potential slight increase in the use of plant protection products. However, these trade-offs are expected to diminish in the medium term as the benefits of improved soil health become more pronounced.

Regarding the digital showcase map, which aims to promote reduced soil tillage practices, a potential trade-off arises in the short term if the cost of marketing activities to raise awareness exceeds the willingness of the community to contribute to local soil health funds. This, too, is anticipated to be a temporary challenge. In the longer term, a possible trade-off is that private contributions to the local community fund may divert financial resources from other areas where they could be utilized, posing a challenge to sustaining consistent investment in soil health initiatives.

c. Value capture

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

Primarily: Climate control, Economic viability, secondarily: Plant production

- **How is value distributed along the stakeholders?**

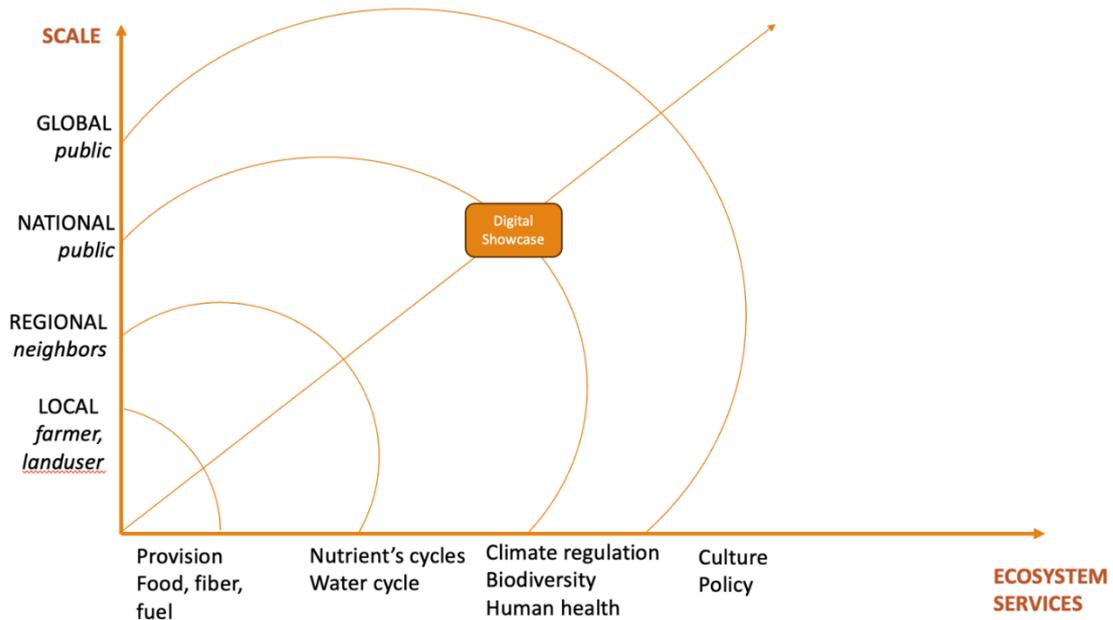
The distribution of value among stakeholders is relatively balanced, with farmers positioned at the core. As the primary implementers of the business model, farmers would receive significant benefits, including potential financial support from local community funds and long-term gains from increased crop production. Local and state authorities would benefit through reduced greenhouse gas emissions and enhanced carbon sequestration in soils, which helps in meeting climate targets and avoiding penalties associated with emission reductions. Furthermore, this contributes positively to broader climate change mitigation efforts. Advisory services would gain by expanding the range of their offerings, as the adoption of sustainable practices increases demand for specialized knowledge and guidance. Agricultural cooperatives would benefit from the improved profitability and revenue generated by farmers' enhanced productivity.



- **Where do the resources come from (public/private)?**

The primary source of resources is anticipated to be private contributions from local businesses and community members to the local community fund. However, there is also the potential for public contributions from state or municipal authorities to supplement these private investments.

- **How is soil health described and framed by the business model? (place in the picture)**



4.2 Solution mapping synthesis

Finally, participants to the workshop are asked to discuss the needs changes for the development of soil health BM and frame them on a temporal scale.

a. What innovations and changes are we looking for?

Firstly, there is a pressing need for the clear prioritization of European Green Deal targets at both the European Union and national levels. Participants expressed concern that the transition to reduced soil tillage and enhanced carbon sequestration may necessitate a short- to medium-term increase in the use of plant protection products. This potential increase is seen as conflicting with the EU-wide objective of reducing the usage of such products. The group emphasized that, unless scalable and economically viable alternatives to current plant protection methods are developed, this issue must be addressed to align with broader sustainability goals.

Secondly, there is skepticism regarding the effectiveness of the proposed digital showcase map, which is intended to display fields with reduced tillage practices. The participants doubted that this initiative alone would be



sufficient to elevate societal awareness to the extent necessary for the public to actively support and contribute to a local community fund. Thus, additional strategies may be required to engage the community and foster the desired level of involvement and financial backing.

b. What regulatory and policy conditions would we need?

- What regulations (binding or not) and resources (new incentives) are needed?

To ensure the success of the proposed business model, the implementation of binding legislation mandating the use of catch crops, soil liming, and reduced tillage practices across a specified percentage of arable land is considered advantageous for promoting soil health and supporting the business model in question. However, it is important to note that the appropriateness and potential stringency of such legislation warrant further discussion to avoid overly harsh regulatory measures.

Additionally, participants recognized the necessity of initial financial support to establish local community funds aimed at financing soil-friendly practices in various regions. In this context, contributions from municipal or state authorities would be crucial, particularly during the initial years, to effectively stimulate these funds and encourage widespread adoption of sustainable practices.

- Is there some contradictions between tools and/or policies?

The participants highlighted several contradictions between existing tools and policies. Although soil-friendly agricultural practices, such as reduced tillage, are financially supported under Latvia's Common Agricultural Policy (CAP) Strategic Plan, this support inadvertently creates barriers to the implementation of more ambitious mandatory legislation at the national level. The current framework permits the allocation of CAP resources only to practices that exceed the requirements established by national legislation. Consequently, some countries may be reluctant to incorporate soil-friendly practices into their national laws, as doing so would preclude them from directing CAP funds towards these practices. Moreover, it is important to note that certain soil-friendly practices might impede the swift adoption of other European Union targets, such as the reduction in the use of plant protection products. This potential conflict underscores the need for careful consideration and alignment of policies to ensure that advancements in one area do not inadvertently stall progress in others. What could be the effect of the soil monitoring law?

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

The introduction of a soil monitoring law is anticipated to have several significant effects across the agricultural sector in Europe. Primarily, it would establish a standardized baseline for soil analysis, ensuring that definitions and methods are consistent among farmers across all EU member states. This



harmonization would facilitate the comparability of soil health data across different regions and countries, enabling more accurate assessments of soil conditions on a continental scale. Additionally, the law would provide a framework for evaluating the impact of various agricultural practices on soil health, allowing for more informed conclusions about the benefits of specific methods. It would also play a crucial role in defining the key indicators and criteria that determine soil health, thus contributing to a clearer understanding of what constitutes healthy soil. However, it is important to acknowledge that the soil monitoring law is still under development, and several uncertainties remain. A key concern is whether the EU-wide framework will adequately account for the diverse national and natural variations in soil types across different member states. Addressing these differences will be essential to ensure the law's effectiveness and relevance in diverse agricultural contexts.

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

The successful implementation of the business model will necessitate specific contractual solutions and guarantees to ensure compliance and transparency. The core requirement is for farmers to adopt reduced tillage practices. To verify adherence, an effective monitoring mechanism must be established. Fortunately, this challenge is mitigated by the fact that farmers in Latvia are already obligated to report their tillage methods at the parcel level to the Ministry of Agriculture. To facilitate the integration of this data into the business model, a formal contract will be required between the developers of the digital showcase map and the Ministry of Agriculture of Latvia. This agreement will govern the transfer and use of agricultural data, ensuring that the digital showcase accurately reflects the on-ground practices. Additionally, it is implied that these contracts should include clear terms regarding data security, privacy, and the accuracy of reporting to maintain trust and integrity in the system.

- c. What resources could facilitate the change?

4.3 Pathways mapping

Table 4 Pathways mapping

	Short term (up to 3 years)	Medium (3 - 7 years)	Long term (after 7 years)
INNOVATIONS			
Regulations and binding policies			Regulation mandating soil friendly practices



			in certain part of arable land
Incentive instruments	Investment in reduced tillage machinery, support for reduced tillage	Investment in reduced tillage machinery, support for reduced tillage	Support for reduced tillage
Contractual solutions	National/municipal contribution to community fund	National/municipal contribution to community fund	
Infrastructure	n/a	n/a	n/a
Product	n/a	n/a	n/a
Services	Intensive marketing of digital showcase	Intensive marketing of digital showcase	
Technology	Establishing digital showcase	Improvement of showcase with other soil friendly practices	Improvement of showcase with other soil friendly practices
Institutions	n/a	n/a	n/a
Actors' configuration	n/a	n/a	n/a
Coordination mechanisms and partnerships	Contracts with state agencies, voluntary contracts with local communities	Contracts with state agencies, voluntary contracts with local communities	Contracts with state agencies, voluntary contracts with local communities
RESOURCES			
skills, knowledge, R&D	Investment in new soil health improving technologies, investment to overcome negative impacts on other targets	Investment in new soil health improving technologies, investment to overcome negative impacts on other targets	Investment in new soil health improving technologies, investment to overcome negative impacts on other targets
DRIVERS: social habits, economic, environmental	Increase of awareness of soil ES	Increase of awareness of soil ES	Increase of awareness of soil ES



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