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Mapping of existing incentives for soil health business models in EU – methodological approach

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Abstract

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Incentives influence ecosystem services through motivating changes in land use and management. This chain of influence is complex because incentives can cause multiple intended and unintended changes in land use and management, each potentially having co-benefits and trade-offs across multiple ecosystem services. The incentives that can help the business model to become sustainable from the point of view of the soil health have been identified and assessed in the frame of NOVASOIL project[1]. The research aims to explore the incentives that drive farmers to act towards improving soil health. These factors (incentives) are then applied to the business model canvas (BMC). By consolidating these incentives into a map, a comprehensive overview is created to understand how they contribute to the current state of the business model and the improvement of soil health. Through this process, the focus is to address the question of how soil health business models can effectively contribute to the maintenance of sustainable and competitive agriculture. By reviewing and assessing the key incentives for soil health, we produce a provisional set of critical incentives, mapped onto the BMC.

Keywords: soil health; incentives for ecosystem services; farmers; BMC; mapping

Introduction

Addressing soil health challenges requires innovative approaches that incentivize and reward sustainable land management practices. In recent years, there has been a growing interest in the development of business models that align economic profitability with soil health improvement. These models encompass a range of strategies, from precision agriculture and regenerative farming practices to carbon sequestration projects that harness the potential of healthy soils to act as carbon sinks. The sustainable management of soil resources is paramount for global food security and environmental well-being. Soil health, defined as the capacity of soil to function as a living ecosystem, is crucial for supporting agricultural productivity, maintaining biodiversity, and mitigating climate change (Lal, 2014). Despite its fundamental importance, soil degradation remains a pressing issue, with approximately one-third of the world's soils considered degraded (FAO, 2015). The degradation of soil health not only threatens agricultural systems but also has cascading effects on water quality, ecosystem services, and human livelihoods.

The pursuit of sustainable agricultural practices has gained paramount importance in contemporary discourse due to its pivotal role in ensuring global food security and

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environmental conservation (Godfray et al., 2010; Tilman et al., 2011). Central to this endeavor is the enhancement of soil health, a critical determinant of agricultural productivity and ecological stability (Lal, 2015). Promoting soil health not only mitigates greenhouse gas emissions and conserves water resources but also fosters resilient agroecosystems capable of withstanding fluctuating climatic conditions (Mäder et al., 2002; Lal, 2018).

In recent years, the integration of business models into soil health enhancement strategies has emerged as a promising avenue for sustainable agriculture (Schipanski et al., 2016; Favoino and Hogg, 2008). These models seek to align economic incentives with soil health practices, thereby motivating stakeholders, from individual farmers to agribusiness enterprises, to adopt and invest in soil-friendly technologies and management practices (Bongiovanni and Lowenberg-De Boer, 2004). While the concept of "soil health business models" holds promise, there is a need for a comprehensive understanding of the diverse incentives that drive such models.

This paper aims to provide a methodological mapping approach of incentives associated with soil health business models, thereby offering a valuable resource for policymakers, land managers, and businesses seeking to promote sustainable soil management practices. This chain of influence is complex because incentives can cause multiple intended and unintended changes in land use and management, each potentially having co-benefits and trade-offs across multiple ecosystem services. The incentives that can help the business model to become sustainable from the point of view of the soil health have been identified and assessed. By synthesizing empirical data from diverse agricultural contexts, it is endeavored to provide a nuanced framework for designing and implementing effective soil health business models tailored to specific agro-ecological regions. By integrating insights from diverse fields, we seek to contribute to a holistic understanding of the dynamic landscape of soil health business models, thereby facilitating the transition towards more sustainable and resilient agricultural.

Materials and Methods

Data collection

For the mapping of the incentives was collected information for 10 farms in 7 countries in EU (Table 1). The data collection was performed using a survey. The survey was carried out in 2023. The focus was to evaluate the influence of a specific incentive to the defined components of the business model (using BMC) and to the soil health. Also, it was collected information, which sustainable development goals and CAP objectives are affected.

Incentives

Incentives, in general, represent a complex and multifaceted concept with different understandings depending on the context and application. Incentives are often defined as any factor that motivates or encourages an individual or group to take a particular action (Ariely, 2016). According to this definition, incentives can take different forms, including monetary rewards, recognition, penalties, and social status. Another definition of incentives emphasizes the role of rewards in shaping behavior (Deci et al., 1999). In this view, incentives are defined as external rewards or reinforcements that can influence behavior but do not necessarily change one's underlying motivation or beliefs. Incentives are often defined as rewards or punishments that influence behavior or motivate individuals to take certain actions (Gneezy and Rustichini, 2000). According to this definition, incentives can take many forms, including monetary rewards, penalties, recognition, or social status. Fehr & Gächter (2000) highlight that incentives can be shaped by social norms and values, which can

Table 1. The NOVASOIL case studies included in the analysis

№	Country	Name	Business model type
1	Spain	Integrated production	Value chain
2	Spain	Organic wine in Rueda, Spain (Rueda)	Value chain
3	Bulgaria	Integrated production in the vineyards with vinery and rural tourism	Value chain
4	Italy	District of the Sands – Emilia-Romagna	Collective and value chain
5	Italy	A model for multifunctional and sustainable local development of marginal areas – Tuscany Region	Collective and value chain
6	Latvia	Crop production and animal farming	Value chain
7	Switzerland /Germany/ Austria	Soil Fertility Fund	Agricultural production
8	Germany	CO_2-Land	Agricultural production/value chain
9	Estonia	Crop production	Agricultural production
10	United Kingdom	Crop production	Value chain

determine what is considered desirable or acceptable behavior. This view focuses on the role of social norms and values in shaping incentives.

Therefore, they are widely used instruments in various contexts, including economic, social, and environmental spheres, to motivate and encourage desired behaviors. In economic contexts, incentives are often used to align individual and collective interests and achieve efficient outcomes (Mankiw, 2014). In social contexts, incentives are used to motivate and encourage positive behavior, such as charitable giving or volunteering (Gneezy and List, 2016). In environmental contexts, incentives can be used to encourage sustainable practices and conservation efforts (Pagiola, 2008). Often, incentives are seen as a key tool used by governments and organizations to encourage certain behaviors or actions. They can take many forms and can be used to align individual and collective interests, shape preferences and beliefs, and ensure the fair distribution of benefits and costs.

For the NOVASOIL project, the applied definition of the ***incentives*** is stimuli or rewards offered to people to motivate them to perform certain desired actions or behaviors. Incentives can be positive (rewards) or negative (punishments).

Soil health business models

For the NOVASOIL project, **soil health** means the ability of soil to sustain and improve the biological, chemical, and physical properties that support plant growth and other ecosystem functions, as well as the **business model** as a framework that outlines how a company operates, creates, delivers, and captures value.

The goal of these soil health business models is to foster sustainable and competitive agriculture. A structured approach was developed to spatially map existing incentives and their delivery of various ecosystem services through different business models in NOVASOIL case studies. These issues raise questions regarding the social and environmental viability of soil health business models that produce safe food, as well as how existing incentives can be combined with soil restoration technologies. However, many of these investments fail to adequately address the three pillars of sustainable development: economic growth, environmental stewardship, and social inclusion.

To describe the business models, the Business Model Canvas was adopted. For analysis purposes, the nine principal canvas building blocks were merged into five blocks, aiming to enhance clarity in the mapping process. The five blocks are named as follows: Customer Value Proposition, Channels and Partnerships, Revenue and Cost Structure, Key Resources, and Key Activities. Figure 1 illustrates the transition between the Business Model Canvas building blocks and the NOVASOIL building blocks. Through this transformation, the content of the NOVASOIL business model building blocks remain unchanged, while the number of blocks is reduced to facilitate a clearer analysis. During the assessment process, the influence of incentives on sustainability and competitiveness is measured by evaluating the NOVASOIL building blocks. In the context of the business model, sustainability is interpreted through the socioeconomic blocks and the environmental/technical blocks from the NOVASOIL business model building blocks. Competitiveness is measured by the Revenue and Cost Structure block of the NOVASOIL business model building blocks.

The simplified version of the Business Model Canvas is utilized for estimating the business model (Figure 1). For the mapping purposes, the NOVASOIL business model building blocks can be further grouped into two main categories. The first category is the socioeconomic block, which comprises the customer value proposition, channels and partnerships, and revenue and cost structure. The second category is the environmental/technology block, which encompasses key resources and key activities. These two groups, along with soil health, serve as the key elements in the mapping process.

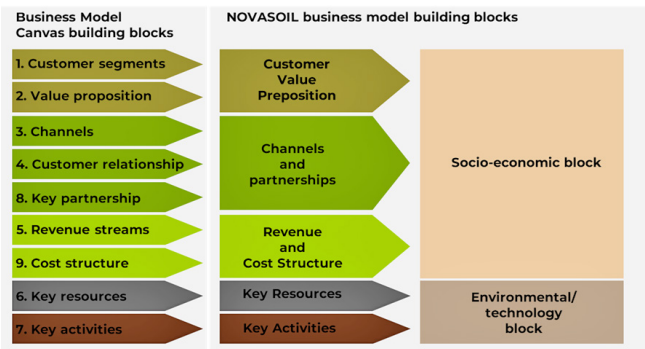

Fig. 1. Business Model Canvas to NOVASOIL building blocks transition
Source: Authors' figure

Mapping approach and the process of incentives mapping

Mapping is an indispensable process and practice with far-reaching applications in diverse fields and industries. Its primary purpose is to facilitate the comprehension and analysis of spatial data, thereby enhancing decision-making, problem-solving, and planning in a variety of contexts. By translating complex information into visual forms, mapping allows for the identification of patterns, trends, and relationships that might otherwise be difficult to discern. Moreover, mapping plays a pivotal role in bridging the gap between

abstract data and tangible reality, making it a vital instrument in fields such as geography, urban planning, environmental science, epidemiology, and social sciences (Slocum et al., 2009; Longley et al., 2015; Kraak and Ormeling, 2019; Peterson, 2018; Krygier and Wood, 2016; Pickles, 1995).

However, it is crucial to acknowledge that mapping is not devoid of subjectivity. The choices made by cartographers or analysts in the process of representation, from scale and symbolization to data selection, can significantly impact the utility and accuracy of maps. Therefore, the quality of a map hinges on the expertise, methodology, and data sources applied during its creation.

The mapping approach is applied in different scientific disciplines. In social science research, provides the opportunity for gaining insights into the spatial aspects of social phenomena. According to Cromley & McLafferty (2012), the mapping approach in the social science research involves the use of geographic information systems (GIS) and spatial analysis techniques to visualize and analyze various social phenomena in a geographical context. Researchers use this approach to represent data related to demographics, economic disparities, crime rates, social networks, or any other social variables on maps. By doing so, they can identify spatial patterns, clusters, and trends that provide insights into the spatial dimensions of social processes and relationships. Researchers employ this approach to understand the spatial distribution of various social factors. Through spatial mapping, researchers can uncover patterns, correlations, and disparities that might not be evident through traditional statistical analysis, leading to more informed policy decisions and social interventions (Holt et al., 2011). These brief explanations highlight how the mapping approach is utilized in social science research to gain insights into the spatial aspects of social phenomena and provide citations to relevant literature.

For the NOVASOIL project, mapping is used as a systematic process tool and practice of visually representing spatial information, relationships, and data. It serves as a critical tool for effectively communicating the layout, distribution, or attributes of objects, areas, or phenomena within a defined geographic or conceptual context.

Mapping incentives is a visual exercise and analysis tool that can be used to further determine which incentives are most useful according to the set criteria. Mapping allows us to see where the incentives stand when evaluated by the same key criteria and compared to each other. It helps visualize the complex interplay of issues and relationships. The incentives can change over time. That is why it is reasonable to fix a period for the analysis. The period for mapping of the incentives is 2014-2022. The incentives mapping aims to categorize incentives that have been implemented within the agricultural and forestry sector to promote soil health business models, encompassing social, economic, and environmental aspects.

The mapping process is divided into four phases (Figure 2):

- Identifying

Mapping incentives is both a visual exercise and an analysis tool that helps determine the most useful incentives based on established criteria. Through mapping, it becomes possible to assess the position of incentives in relation to one another and evaluate them according to the same key criteria. This process aids in visualizing the intricate interconnections between issues and relationships. In this phase, the incentives related to each business model (BM) in various NOVASOIL case studies were identified.

- Analyzing

For the analysis, incentives will be mapped based on their application to soil health and business models. The research focuses on three main aspects: soil health, the socioeconomic block, and the technology block. In the project case studies, incentives will be identified and their impact

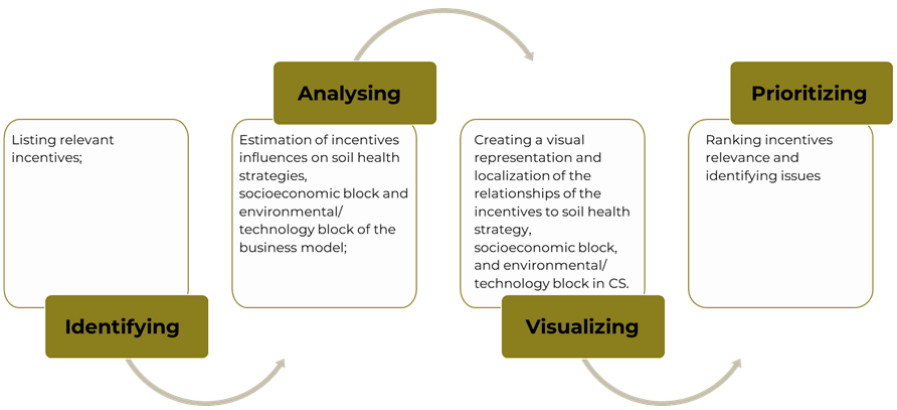

Figure 2. Four phases of the mapping process
Source: Authors' figure

on the soil health strategy, the socioeconomic block, and the environmental/ technology block will be assessed. The assessment will be conducted using a three-level scale (low, medium, and high).

- Visualizing

To visualize the estimated incentives, a coordinate system in the form of a circle (Figure 3) will be used. The y-axis represents the influence of an incentive on the soil health strategy, while the x-axis represents the influence on the socioeconomic block of the business model.

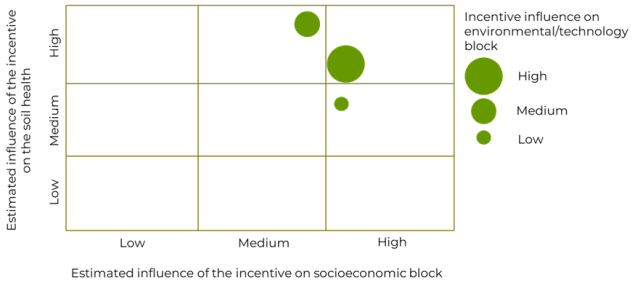

Fig. 3. Visualization of the mapping incentives
Source: Authors' figure

The y-axis is directly assessed by experts. The x-axis influence is calculated as the average of its three components: customer value proposition, channels and partnerships, and revenue and cost structure. The size of the circle indicates the influence of the incentive on the environmental/technology block, calculated as the average of key resources and key activities.

- Prioritizing

The incentives will be rated based on these criteria, resulting in the formation of 9 quadrants (Figure 4). Table 2 provides a description of the characteristics of each quadrant. In the graphic, additional information is conveyed through the

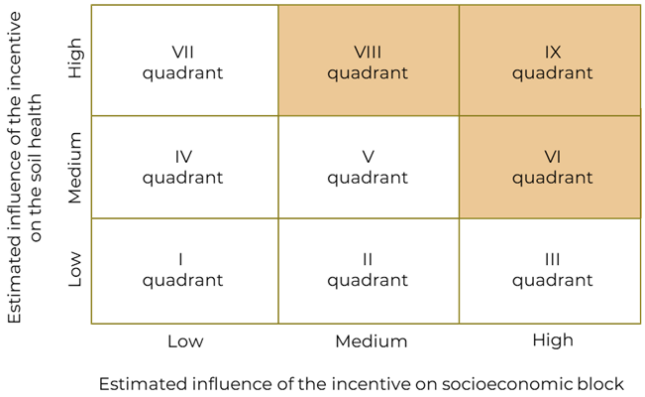

Fig. 4. Quadrants distribution of the mapping incentives
Source: Authors' figure

size of the balloons. The largest size indicates a strong influence of the incentive on the environmental/technology block, while medium and small size bubbles indicate medium and low influence, respectively. The bottom left quadrants represent the lowest influence of the incentives, while the top right quadrants (VI, VIII, and IX) indicate the highest influence.

Results and Discussion

In the NOVASOIL project were four types of business models defined in these 10 case studies (farms) — Value chain, Collective and value chain, Agricultural production, and Agricultural production/value chain. They were named NOVASOIL Business Model Types (BMT). During the survey was collected information for 61 incentives that are applied in the selected case studies.

- Business Models – Value chain

Business models under the value chain typology consist of different models where the producer or product is seen and managed as part of a larger system. It is a multistage

Table 2. Characterization of the quadrants

Quadrants	Characteristics of the quadrant
Quadrant 1	The incentive has low influence on soil health strategies and low influence on socioeconomic block of the business model
Quadrant 2	The incentive has low influence on soil health strategies and medium influence on socioeconomic block of the business model
Quadrant 3	The incentive has low influence on soil health strategies and high impact on socioeconomic block of the business model
Quadrant 4	The incentive has medium influence on soil health strategies and low influence on socioeconomic block of the business model
Quadrant 5	The incentive has medium influence on soil health strategies and medium influence on socioeconomic block of the business model
Quadrant 6	The incentive has high influence on soil health strategies and medium influence on socioeconomic block of the business model
Quadrant 7	The incentive has high influence on soil health strategies and low influence on socioeconomic block of the business model
Quadrant 8	The incentive has high influence on soil health strategies and medium influence on socioeconomic block of the business model
Quadrant 9	The incentive has high influence on soil health strategies and high influence on socioeconomic block of the business model

Source: Authors' table.

process that allows for the application of various business models. Value chains can help increase efficiency in product creation or provide a competitive advantage by delivering unique products at the lowest possible price. Figure 5 provides a summary of the incentives that fall under the value chain type of business models, while Table 3 offers complete descriptions and ratings of these incentives.

Six incentives have been identified in the value chain business model. Three of them, namely B, C, and D, show a high degree of influence on soil health strategies. The remaining incentive, A, has a medium influence. One incentive, D, has a high influence on the socioeconomic block of the business model, while incentives A, B, and C have a low influence in this block. The influence over the technology block of the business model varies. Two groups of incentives have a high influence, namely C and D, while the influence is estimated to be low for incentives A and B. Therefore, the main prioritized incentive for this business model is D, as it has a significant positive influence.

- Business Models – Collective and value chain

Collective and value chain business model adds a collective action in the business model. It can be in the form of regulation, certification, or other similar measures. The outcome of applying the model has an impact on society, resources, and technology. Figure 6 provides a summary of

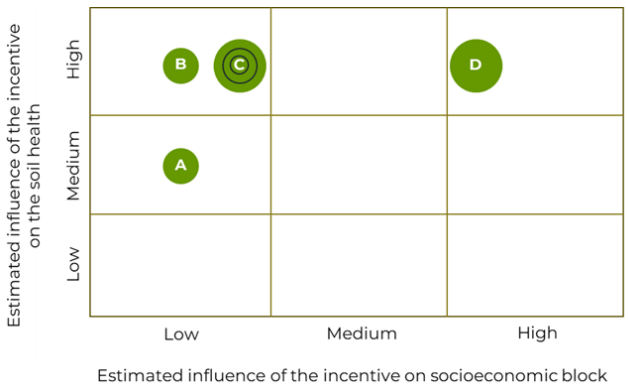

Fig. 5. Mapping incentives for Business Models – Value chain

Source: Authors' figure

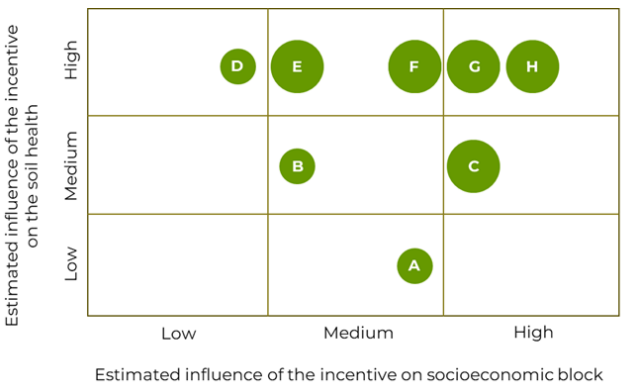

Fig. 6. Mapping incentives for Business Models – Collective and value chain

Source: Authors' figure

Table 3. Classification of the incentive by quadrant for Business Models – Value chain

	Incentive	Estimated influence of the incentive on business model socioeconomic block	Estimated influence of the incentive on the soil health strategies	Estimated influence of the incentive on the technology block	Quadrant
A	Eco-scheme (Direct payments for Ecosystem services)	Low (1.0)	Medium (2.0)	Medium (2.0)	VII
B	Direct payments for conversion of arable agricultural land into permanent grass areas	Low (1.0)	High (3.0)	Medium (2.0)	VII
C1	Direct payment for soil cover in permanent crops	Low (1.3)	High (3.0)	Low (1.0)	VII
C2	Direct payments for conversion of arable agricultural land into permanent grass areas	Low (1.3)	High (3.0)	High (2.5)	VII
C3	Agroforestry transition to forestry	Low (1.3)	High (3.0)	Medium (2.0)	VII
D	Direct payments for adoption of alternative land management practices	High (3.0)	High (2.7)	High (3.0)	IX

Source: Authors' table.

Table 4. Mapping incentives for Business Models – Collective and value chain

	Incentive	Estimated influence of the incentive on business model socioeconomic block	Estimated influence of the incentive on the soil health strategies	Estimated influence of the incentive on the technology block	Quadrant
A	PSR measure 3 (quality systems)	Medium (2.3)	Low (1.0)	Medium (2.0)	II
B	Greening – IT3c.	Medium (1.7)	Medium (2.0)	Medium (2.0)	V
C	GLOBALGAP	High (2.7)	Medium (2.0)	High (3.0)	VI
D	PSR measure 10 (agro-environmental payments)	Low (1.3)	High (3.0)	Medium (2.0)	VII
E	PSR measure 12 (Natura2000)	Medium (1.7)	High (3.0)	High (3.0)	VIII
F1	SQNPI	Medium (2.3)	High (3.0)	High (2.5)	VIII
F2	PSR measure 10 – IT2	Medium (2.3)	High (3.0)	High (2.5)	VIII
G1	PSR measure 11 (organic)	High (2.7)	High (3.0)	High (3.0)	IX
G2	PIF – IT2	High (2.7)	High (3.0)	High (3.0)	IX
H	PSR measure 11 – IT3c	High (3.0)	High (3.0)	High (3.0)	IX

Source: Own calculations

the incentives associated with Collective and Value Chain business models. Table 4 presents detailed descriptions and ratings of these incentives.

Ten incentives are identified in the BM Collective and value chain. Five of them – D, E, F, G, and H – show a high degree of influence on soil health strategies. The remaining three incentives – B, C, and D – have a medium influence, while A has a low influence. Among these incentives, G and H have a high influence on the socioeconomic block of the business model. Four incentives – A, B, F, and G – have a medium influence, and one – D – has a low influence on the socioeconomic block. The influence over the technology block of the business model is mixed. Three incentives – A, B, and D – have a medium influence, while the influence is estimated as high for the rest of the incentives – C, E, F, G, and H. Therefore, incentives C, E, F, F, G, and H can be prioritized as the main incentives, as they have a significantly positive and important influence.

- Business Models – Agricultural production

The agricultural production business model emphasizes farm-level measures to foster soil fertility. Within this model, various instruments can be employed, such as conservation agriculture techniques (e.g., reduced or no tillage, cover crops), crowd funding for conservation projects, crop production technologies and machinery, and the use of measurement and digital tools that aid in improving soil health. Figure 7 provides a summary of the incentives associated with the agricultural production business model. For detailed descriptions and ratings of the incentives, please refer to Table 5.

Fig. 7. Mapping incentives for Business Models – Agricultural production
Source: Authors' figure

Table 5. Mapping incentives for Business Models – Agricultural production

	Incentive	Estimated influence of the incentive on business model socioeconomic block	Estimated influence of the incentive on the soil health strategies	Estimated influence of the incentive on the technology block	Quadrant
A	VNP-H30 (result-based grassland use)	Low (1.3)	Low (1.0)	Low (1.0)	I
B1	KULAP-B32/33/34 (watercourse and erosion control strips)	Low (1.0)	Medium (2.0)	Low (1.0)	IV

Table 5. Continued

B2	KULAP-B19-23 (extensive grassland use for ruminants)	Low (1.0)	Medium (2.0)	Low (1.0)	IV
B3	VNP-H11 (extensive cropland management for field breeders and field wild herbs)	Low (1.0)	Medium (2.0)	Low (1.0)	IV
B4	VNP-H12-14 (fallows on arable land with self-vegetation for species protection reasons)	Low (1.0)	Medium (2.0)	Low (1.5)	IV
B5	Federal programme for boosting energy efficiency and CO_2 savings in agriculture and horticulture (Bundesprogramm zur Steigerung der Energieeffizienz und CO_2-Einsparung in Landwirtschaft und Gartenbau)	Low (1.0)	Medium (2.0)	Low (1.0)	IV
B6	PAULa (cultivation break)	Low (1.0)	Medium (2.0)	Low (1.0)	IV
C1	KULAP-B37 (mulch sowing for row crops)	Low (1.3)	Medium (2.0)	Low (1.5)	IV
C2	KULAP-B38 (stripe-/ Direct sowing for row crops)	Low (1.3)	Medium (2.0)	Low (1.5)	IV
C3	FAKT 1-D1 (no chemical-synthetic pesticides and fertilizer)	Low (1.3)	Medium (2.0)	Medium (2.0)	IV
D1	KULAP-B43/44/45 (diverse crop rotation with flowering species, protein plants or large grain legumes)	Medium (1.7)	Medium (2.0)	Low (1.5)	V
D2	Single Area Payment Scheme + green direct payment.	Medium (1.7)	Medium (2.0)	High (2.5)	V
E1	BBodSchG, BBodSchV (Soil Protection Law and accompanying Soil Protection Directive)	Low (1.0)	High (3.0)	Low (1.0)	VII
E2	DüV DüngG – Fertilizer Directive (Düngemittelverordnung – DüV) and Fertilizer Law (Düngegesetz – DüngG)	Low (1.0)	High (3.0)	Low (1.0)	VII
E3	DüMV Fertilizer directive (Regulation on the placing on the market of fertilizers, soil additives, growing media and plant additives – DüMV)	Low (1.0)	High (3.0)	Low (1.0)	VII
E4	Greening (preservation of permanent grassland)	Low (1.0)	High (3.0)	Low (1.5)	VII
E5	FUL-13 (10-year-set-aside)	Low (1.0)	High (3.0)	Low (1.0)	VII
F	VNP-H20 (conversion of arable land to grassland)	Low (1.3)	High (3.0)	Medium (2.0)	VII
G1	KULAP-B30 (extensive Grassland)	Medium (1.7)	High (3.0)	Medium (2.0)	VIII
G2	KULAP-B35/36 (winter greening / intercropping)	Medium (1.7)	High (3.0)	Low (1.5)	VIII
G3	Environment friendly production eco plan (specify).	Medium (1.7)	High (3.0)	High (3.0)	VIII
G4	Greening (crop diversification)	Medium (1.7)	High (3.0)	Low (1.5)	VIII
G5	Support for land melioration. (Investment support for the development and maintenance of agricultural and forestry infrastructure)	Medium (1.7)	High (3.0)	High (3.0)	VIII
H	KULAP-B10 (organic farming)	High (3.0)	High (3.0)	High (3.0)	IX

Source: Own calculations

Twenty-four incentives are identified in the BM Agricultural production. Four of them – E, F, G, and H – show a high degree of influence on soil health strategies. The remaining three incentives – B, C, and D – have a medium influence, while A has a low influence. In terms of the socioeconomic block of the business model, incentive H has a high influence. Five incentives – A, B, C, E, and F – have a low influence, while D and G have a medium influence. The influence over the technology block of the business model is mixed. Four incentives – B, C, E, and F – have a medium influence, and the influence is estimated as high for incentives D, G, and H. Incentive A is estimated to have a low influence. Therefore, incentives G and H can be prioritized as the main incentives, as they have a significantly positive and important influence.

- Business Models – Agricultural production/value chain

Agricultural production/value chain business models combine the characteristics of both agricultural production business models and value chain business models. They focus on individual farm-level instruments to increase soil health, while also targeting the potential upscaling of the concept for soil health recovery within the value chain. Figure 8 summarizes the incentives associated with agricultural production/value chain business models, while Table 6 provides detailed descriptions and ratings of these incentives.

A total of 20 incentives have been identified in the agricultural production/value chain business model. Among them, Group C exhibits a high degree of influence on soil health strategies, while Group B and Group A have medium and low influence, respectively. Group C incentives have a high influence on the socioeconomic aspect of the business model, while Group A has low influence and Group B has medium influence. In terms of the technological aspect of

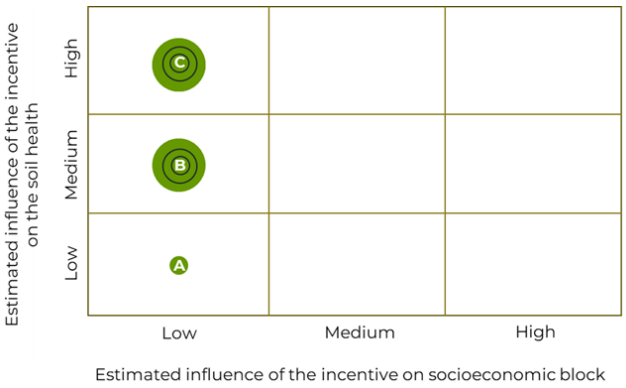

Fig. 8. Mapping incentives for Business Models – Agricultural production/value chain
Source: Authors' figure

Table 6. Mapping incentives for Business Models – Agricultural production/value chain

	Incentive	Estimated influence of the incentive on business model socioeconomic block	Estimated influence of the incentive on the soil health strategies	Estimated influence of the incentive on the technology block	Quadrant
A	VNP-H30 (result-based grassland use)	Low (1.3)	Low (1.0)	Low (1.0)	I
B1	KULAP-B32/33/34 (watercourse and erosion control strips)	Low (1.0)	Medium (2.0)	Medium (2.0)	IV
B2	KULAP-B37 (mulch sowing for row crops)	Low (1.0)	Medium (2.0)	Low (1.0)	IV
B3	KULAP-B38 (stripe-/ Direct sowing for row crops)	Low (1.0)	Medium (2.0)	Low (1.0)	IV
B4	KULAP-B43/44/45 (diverse crop rotation with flowering species, protein plants or large grain legumes)	Low (1.0)	Medium (2.0)	Low (1.5)	IV
B5	KULAP-B19-23 (extensive grassland use for ruminants)	Low (1.0)	Medium (2.0)	Low (1.0)	IV
B6	Federal programme for boosting energy efficiency and CO2 savings in agriculture and horticulture (Federal programme to increase energy efficiency and CO2 savings in agriculture and horticulture)	Low (1.0)	Medium (2.0)	Low (1.0)	IV

Table 6. Continued

B7	VNP-H12-14 (fallows on arable land with self-vegetation for species protection reasons)	Low (1.0)	Medium (2.0)	High (3.0)	IV
B8	PAULa (cultivation break)	Low (1.0)	Medium (2.0)	Medium (2.0)	IV
B9	VNP-H11 (extensive cropland management for field breeders and field wild herbs)	Low (1.0)	Medium (2.0)	Medium (2.0)	IV
C1	KULAP-B30 (extensive Grassland)	Low (1.0)	High (3.0)	Low (1.0)	VII
C2	KULAP-B35/36 (winter greening / intercropping)	Low (1.0)	High (3.0)	Low (1.5)	VII
C3	VNP-H20 (conversion of arable land to grassland)	Low (1.0)	High (3.0)	High (3.0)	VII
C4	Greening (crop diversification)	Low (1.0)	High (3.0)	Low (1.0)	VII
C5	KULAP-B10 (organic farming)	Low (1.0)	High (3.0)	Low (1.5)	VII
C6	BBodSchG, BBodSchV (Soil Protection Law and accompanying Soil Protection Directive)	Low (1.0)	High (3.0)	Low (1.0)	VII
C7	DüV DüngG – Fertilizer Directive (Fertilizer Ordinance – DüV) and Fertilizer Law (Fertilizer Act – DüngG)	Low (1.0)	High (3.0)	Low (1.5)	VII
C8	DüMV Fertilizer directive (Regulation on the placing on the market of fertilizers, soil additives, growing media and plant additives – DüMV)	Low (1.0)	High (3.0)	Low (1.0)	VII
C9	Greening (preservation of permanent grassland)	Low (1.0)	High (3.0)	Low (1.0)	VII
C10	FAKT 1-D1 (no chemical-synthetic pesticides and fertilizer)	Low (1.0)	High (3.0)	Low (1.0)	VII
C11	FUL-13 (10-year-set-aside)	Low (1.0)	High (3.0)	High (3.0)	VII

Source: Own calculations

the business model, the influence is mixed. Two incentives (B and C) have a significant influence, while the influence of incentive A is estimated to be low. As a result, it is not possible to prioritize incentives for this business model.

Conclusions

The incentives mapping aims to categorize incentives that have been conducted on the social, economic, and environmental building blocks of soil health business models within the agricultural and forestry sector. The incentives mapping was divided into four phases: identifying, analyzing, visualizing, and prioritizing.

For mapping are used the case studies in the project that evaluates the incentives that have direct influence on the case studies' business model. There were identified a total of 61 incentives in 7 countries. The incentives were assessed and placed on a coordinate system with nine quadrants.

Fourteen (23%) of the incentives are in the top right quadrants (VI, VIII and IX) and have the highest influence over socio-economic indicators and soil health.

Only 1 (16.7%) of the incentives in the Business Models – Value chain is situated in the top right quadrants. From that point of view, incentives are not efficient enough.

BM Collective and value chain have 6 (50%) incentives in top right quadrant that have high degree of influence on soil health strategies. The effectiveness of the incentives here is much higher than in BM – Value chain.

In Business Models – Agricultural production 6 (25%) incentives are in top right quadrants. The main characteristic of this business model is that there are many incentives present.

In the Business Models – Agricultural production/value chain there is none incentive in the top right quadrants, which means that effectiveness of the incentives is low.

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