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DIVINE - DemonstratIng the Value of agri data sharIng for boostiNg data Economy in agriculture

Deliverable D6.3

Title: Validated Agri data sharing policy recommendations - Release 1

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Editors:	**Alessandra Diana (FE)**
Reviewers:	**Enrique Martinez (ADSC), Christine O'Meara (SETU), Anil Turkmayali (IDSA)**
Contributors:	**Delia Milazzo (ENG), Concetta Cardillo (CREA), Lara Resman (KGZS)**

Abstract: With the following Deliverable DIVINE aims at reviewing the regulations and policies proposed in the previous D6.1 and D6.2 in light of the first Pilot Round. This follow up will allow for the development of tailored policies recommendations, improving the quality of the services offered and promoted by DIVINE.

Disclaimer

Revision History

Date	Rev.	Description	Partner
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List of Authors

Partner	Author(s)
FE	Alessandra Diana
ENG	Delia Milazzo
CREA	Concetta Cardillo
KGZS	Lara Resman

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Glossary - Acronyms

AI	Artificial Intelligence
CAP	Common Agricultural Policy
CREA	Consiglio per la Ricerca in agricoltura e l'analisi dell'Economia Agraria
D	Deliverable
EC	European Commission
ENG	Engineering
EU	European Union
F2F	Farm to Fork
FE	Farm Europe
GA	Grant Agreement
IDSA	International Data Spaces Association
IT	Information technology
MAA	Multi Actor Approach
ToC	Table of Content
WFO	World Farmers' Organization
WP	Work Package
WPL	Work Package Leader

Executive Summary

The following deliverable aims at reviewing and updating the policy recommendations developed in D6.1 though gathering the first Pilots Outputs after the completion of Round 1.

As requested by the Grant Agreement, the following document focuses on monitoring three key aspects: Policy Sustainability, Policy impact on Agri sector competitiveness, and the Policies' Social Impact. In order to provide pragmatic results, Pilot partners have been interviewed over these topics. Moreover, they were asked to fill in a survey, which had the scope to help monitoring and suggest Policy Improvements.

The results seem to show that, while not many KPIs are currently in place to monitor DIVINE outcomes and results in those specific fields, overall positive indirect results are expected before the end of the project. On the other hand, the survey highlighted farmer's trust to remain a central issue in promoting data sharing – and it is not totally acquired yet. This factor represents a major issue that DIVINE will need to focus on in the next period, as it represents one of the pillars of the project and of the EU Horizon program.

In order to properly develop the AgriDataSharing platform, and to make sure the project will be taken up after its 36 months development, it will be of a central relevance to produce a tailored data sovereignty model, and to communicate the processes with growers and producers, to allow them to easily understand how their data are managed and safeguarded.

The work and study developed hereafter is based on the outputs of D6.1 and D6.2 (Agri Data Sharing governance policy initiatives), with the aim of monitoring them and evaluating both their effectiveness and impact on farmers. Consequently, the current deliverable presents multiple benefits in different aspects: it contributes to a fair and transparent DIVINE's development, it enhances farmer's trust in the delivered platform, and promotes the development of a lawful and straightforward EU data space ecosystem.

Structure

The following deliverable will be structured as it follows:

It will begin with an introductive chapter, dedicated to reminding the reader the scope of DIVINE and of WP6 – with a focus on Task 6.3 requirements. Moreover, a brief recap on the general concept of data governance will be developed.

Chapter II and Chapter III will represent the core analysis of the developed data governance model. Chapter II Section 1 will explain the analysis methodology, while Section 2 will remind the presented data governance model for DIVINE in D6.1 and 6.2.

As requested by the Grant Agreement (GA), Section 3 Chapter II will be dedicated to establishing the Policy evaluation framework. It will be used to evaluate the outputs of D6.1 and 6.2 on 3 different aspects: Sustainability, Competitivity, and Social Impact. Moreover, the section presents a survey the Pilots were required to fill – allowing for a better evaluation of the data governance model.

The framework created will be applied to DIVINE's pilots in Chapter III – in this way a revision of the proposed policies (Chapter IV) will be put into actionand tailored-made changes will be applied. This step represents a valuable milestone for DIVINE's data governance model, as it will shape the structure and architecture of the Agri data Sharing Space. A clear and easy–to-follow application of the regulation will increase farmer's trust and improve among others the data access, control and quality.

Finally, Chapter V will conclude the report by providing a comprehensive view of the data governance framework in place – highlighting his barriers and flow, but also its advantages and the lessons learned.

1. CHAPTER I - INTRODUCTION

1.1 WP6 - Task 6.3: Impact Monitoring and Assessment for the developed Agri data-sharing governance models, policies, regulations

The following deliverable falls under the WP6 deliverables production. D6.3 is, in fact, the first document published by Task 6.3 and that aims at following up and evaluating the guidelines provided in D6.1 and D6.2.

Its central goal is to monitor and analyze the impact the models described in the previous deliverable have had on the DIVINE pilots. This implies a strict cooperation and synergies with DIVINE WP5 in order to be able to properly produce the deliverable.

This text will be of fundamental importance for the project, not only as it provides the basis for the production of D6.4 and D6.5 scheduled for M22, but also because any relevant issue detected in the governance model by Pilots represents an issue eventual external users may encounter when working with DIVINE Agri Data Space. Thus, a negative image of the platform will be created- and the farmer's trust and users may not find the final product appealing enough.

Moreover, the relevance of an efficient data governance model will help the project and its data space to be compliant with all the EU regulations.

To avoid these potential issues, Task 6.3 is in charge of introducing a dialogue between WP5 and WP6 allowing for information exchange, in order to continually evaluate and refine the DIVINE data governance modes insuring they are fit for purpose for pilot partners, current and future users a data governance model suitable for DIVINE and potential future users.

1.2 Data Governance

As previously mentioned, WP6 and Task 6.3 are dedicated to developing and assessing DIVINE's data governance model, with a specific focus on agricultural data. This involves a thorough analysis of existing regulations outlined in D6.1, as well as the formulation of guidelines for future policy implementation outlined in D6.2.

It's important to note that "governance" can encompass various scopes depending on the specific need, and in the case of DIVINE, we're referring to Data Governance. In this context, Data Governance implies the development of best practices for data sharing, rooted in existing regulations. Key areas to consider include:

- Defining data Sovereignity
- Facilitating data access

- Ensuring secure data storage
- Establishing protocols for data deletion
- Addressing remuneration for data sharing
- Regulating data usage

While these aspects have been broadly addressed by EU regulatory bodies, there is often a need for more concrete and accessible measures. Data Governance Policies play a crucial role in shaping an Agricultural Data Space by providing the fundamental tools necessary to promote the project's adoption and implementation.

2. CHAPTER II – POLICY EVALUATION FRAMEWORK

2.1 Work Organization and Method

The following deliverable has been collaboratively developed by a consortium of partners, namely FE, ENG, CREA, and KGZS, each contributing to the implementation of this report.

In establishing a framework for policy evaluation, the process unfolded as follows:

- Brainstorming Sessions: Multiple sessions were convened among partners, providing a platform to clarify objectives, devise strategies for attainment, and efficiently allocate tasks.
- Research Phase: This stage involved an in-depth exploration to refine the framework for policy evaluation, seeking optimal methodologies and approaches.
- Pilot Engagement: Partners from Task 6.3 liaised with each Pilot within WP5. Through calls, exchanges, and surveys, specific key performance indicators were identified to assess Policy Sustainability, Competitiveness, and Social Impact.
- Data Collection and Analysis: Feedback from all Pilots was diligently collected and synthesized during this phase to glean insights and highlight significant results.
- Lessons Learned: Concluding the process, this phase entailed a comprehensive review of challenges encountered, positive outcomes achieved, and an assessment of their implications on policy formulation and refinement.

2.2 Recap of ADSE policy framework adoption

The Agriculture Data Spaces Ecosystem (ADSE) presents a comprehensive framework for fostering data-driven innovation while ensuring trust, security, and data sovereignty within the agricultural sector, characterized by several complexities. A comprehensive policy framework is adopted to address the specific challenges considering the diverse entities involved, that include legal and natural persons, connectors, gateways, and application contexts. Agri data sharing policy framework adoption concepts and guidelines have been analyzed within D6.2, published at M12 as initial release expected right before the pilot round 1 kick-off.

Central to the ADSE is the concept of ensuring the validity and authenticity of digital certificates used for secure communications. The ecosystem encompasses identifiers for legal entities, derived from eIDAS digital certificates, and potentially for natural persons. Legal entity identifiers follow a structured format, integrating with existing eIDAS certificates, while considerations for natural person identification must navigate privacy concerns, particularly in light of regulations like GDPR.

Standardized APIs and common data models form data exchange within ADSE enable secure data transfer, while common data models ensure consistent representation across different ecosystems. The Data Exchange APIs framework facilitates negotiation and agreement of data exchange contracts, with the NGSI-LD protocol providing a robust interface for accessing context or digital twin data. Through

agreed endpoints, participants can perform a range of operations, from entity management to complex queries and subscriptions.

Ensuring data provenance and traceability is considered essential for building trust and accountability within ADSE. Moreover, identification mechanisms and transparent data use agreements, promote data integrity and reliability. Furthermore, by leveraging verifiable credentials and trusted issuer lists, participants can verify the authenticity of data sources and establish a secure environment for data exchange.

Overall, the adoption of this policies framework underscores the commitment of the ADSE to establishing a secure, trusted, and interoperable data-sharing environment, thus unlocking the potential for data-driven innovation and value creation in the agricultural industry.

2.3 Establishment of an evaluation framework

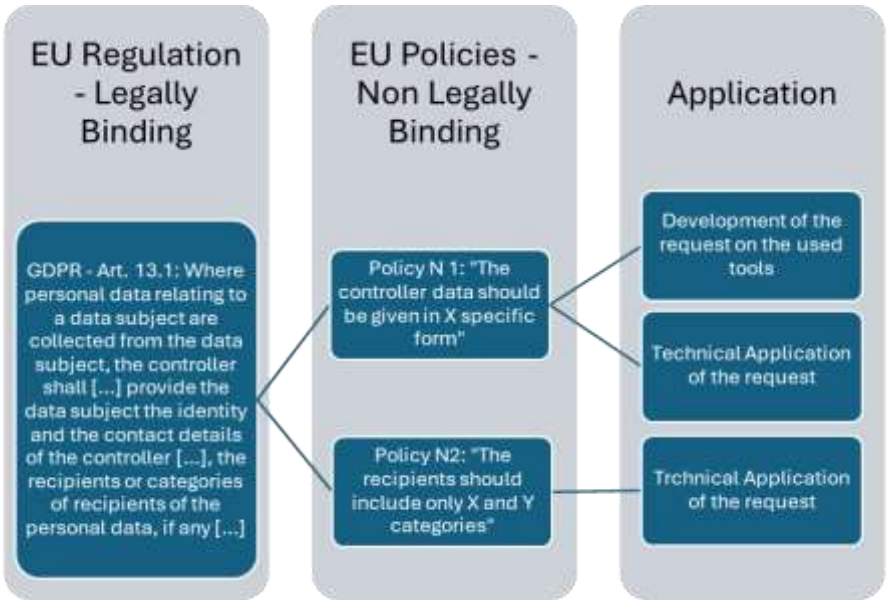
Why to evaluate policies

Policies and Regulation have always played a pivotal role in defining and shaping the conception of different tools, independently of the tool's application sector, or whether the product will be used for one or another purpose. Policy may change and evolve over time and across countries – but everywhere they remain the building blocks of regulatory choices.

While the necessity of relying on these rules in the initial phase of a longer project may seem obvious – especially due to law compliance constraints – following up on the outcomes and the impact of the defined policy may not seem so intuitive.

In essence, the European Union operates through collaboration among various bodies to develop Directives and regulations aimed at promoting responsible behavior among citizens and companies while safeguarding their rights. However, due to their broad applicability, these regulations often lack specificity, making it challenging to apply them effectively to individual cases.

In such scenarios, policies play a crucial role by refining existing regulations and tailoring them to specific contexts. These policies serve as recommendations, offering guidance on how best to implement regulations within the unique parameters of each situation. Their aim is to establish efficient and equitable processes that align with the overarching objectives of the project at hand.



Difference and Hierarchy Between EU Regulation and EU Policy, Source: Own

In this context, the reasoning behind the necessity for a policy evaluation framework appears clearer. Policies being suggestions to technically implement during the project, they shape the structure of the DIVINE Agri-data space.

Properly implementing and tailoring the policies in the Agricultural-data sector will facilitate and ease:

- Farmer's livelihood, by providing them safe, practical and efficient tools to monitor and control their lands;
- Stakeholders, by developing a broad network and data connections;
- Policy makers, by contribute to easing and clarifying the existing regulatory landscape
- Governments, by promoting and increasing the EU's agricultural sector competitivity.

For these reasons, it is important to monitor the farmers (in our case, the pilots) and get feedback, whenever possible. Setting up inefficient Policy Requirements would be detrimental on different steps of the project: a lack of incentives for farmers to share data, or their doubt on the platform's safety would stop them from uploading information and sharing them among stakeholders. This would have an extremely negative impact on the project as a whole – even in cases in which all the other sections were exceptionally developed.

DIVINE Data governance model's Objectives

The DIVINE Data Governance Model aims at establishing an agricultural data space that encourages continuous information sharing among farmers and stakeholders. Central to its mission is the promotion of fair data integration practices and fostering trust among farmers regarding data sharing. Additionally, DIVINE is committed to incorporating EU principles into its framework to ensure compliance and alignment with regulatory standards. By harmonizing these objectives, DIVINE will cultivate an environment conducive to data sharing, ultimately benefiting all participants in the agricultural sector.

How do data spaces work ?

Data Spaces, as outlined by the European Commission's strategy for data in 2020, are designed ad integral components of a unified European data market. The Commission's objective is to establish environments where diverse data sources can be pooled and shared, thereby fostering innovation and competitiveness while upholding data sovereignty. These spaces are designed to empower both companies and individuals to retain control over the data they generate while enabling its utilization for economic, societal, and research purposes.

According to the Commission's Working Document on Common European Data Spaces, a data space consolidates relevant data infrastructures and governance frameworks to facilitate secure data pooling, access, sharing, processing, and usage. Key characteristics of a common European data space include:

- Secure Infrastructure: Ensuring privacy and security in data handling.
- Transparent Access: Providing clear guidelines for fair, transparent, and non-discriminatory data access and usage.
- Compliance: Adhering to European regulations and values, particularly regarding data protection and consumer rights.
- Data Ownership and Compensation: Granting data holders control over access to and sharing of personal or non-personal data, including options for compensation.
- Participation: Encouraging involvement from diverse organizations and individuals.
- Design Principles: Following standardized technical infrastructure, interoperability, and connection protocols.

Data spaces are expected to catalyze digital transformation across various sectors, contributing to economic recovery efforts. Ultimately, the goal is to establish an interconnected European data space that promotes extensive data sharing while ensuring compliance with EU regulations and values.

How does DIVINE data Space works and how policies and regulation impact Data Space Structure

As outlined in D3.1, the initial design of the DIVINE Agricultural Data Model (ADAM) and its support for semantic interoperability with various ontologies and data models builds upon the DEMETER Agricultural Information Model (AIM) and is perceived as AIM II. DIVINE aims to extend model coverage in agricultural domains and align with data sharing policies like the Common Agricultural Policy (CAP).

The specification of DEMETER AIM and subsequently DIVINE ADAM follows a modular approach within a layered architecture, facilitating interoperability, mapping with other models, and easy extension of coverage and domains. This architecture is based on the NGSI-LD 3-layer approach, incorporating a property graph meta-model, common and cross-domain terms layer, and application or domain-specific ontologies layer. Additionally, it includes a layer for pilot-specific extensions. The model emphasizes reusing dominant and well-known models, ontologies, and vocabularies for semantic referencing and alignment.

The layered architecture's general principles and purpose are described to provide clarity and guide its implementation effectively.

Evaluation on Sustainability

Ensuring environmental care and promoting sustainable production and processes are central objectives of EU HORIZON EUROPE, as well as the EU Sustainable Development Goals and Green Deal initiatives. Throughout the development phase of the DIVINE governance model, we've taken into account all the relevant documents associated with these goals.

Given this context, it's crucial to monitor the environmental impact of the policies we develop. This allows us to verify their positive effects and, if necessary, adjust them to meet the required sustainability standards.

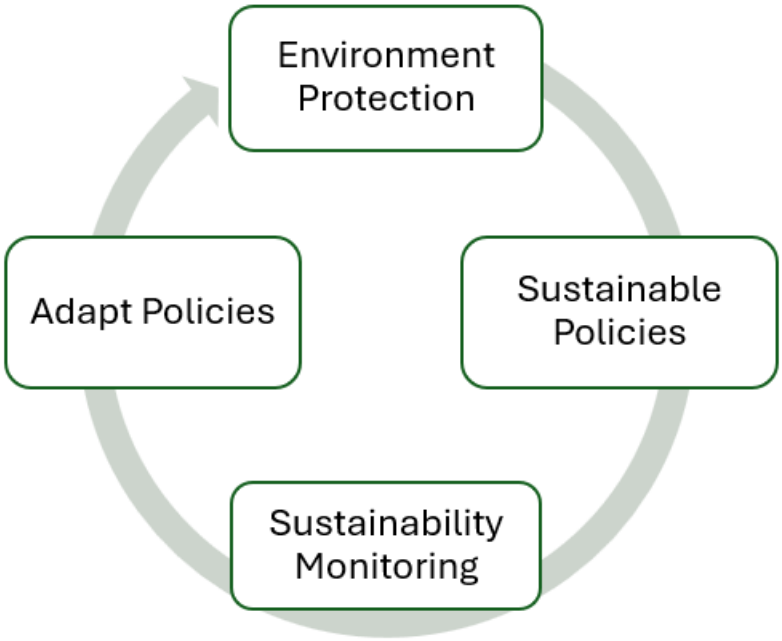


Figure 1: Cycle of Policy Sustainability Monitoring and Implementation. Source: Own

However, when it comes to evaluating the impact and effectiveness of a particular policy, it's not always straightforward. Often, these policies provide recommendations that, if followed, may imply specific practices to be implemented. The first question we need to address is whether these guidelines have been adhered to. This inquiry primarily relates to the data architecture and platform structure rather than the experiences of pilots and farmers.

Thanks to the strict collaboration and the involvement of specific partners in both the Data Governance Model Development (D6.1 and 6.2), and WP2 (Ecosystem Architecture and Technical Integration) and WP3 (Agriculture Data Space Ecosystem - ENG, IDSA), the first question is quickly replied to.
On the other hand, the scope of this Deliverable is focused on assessing the pilots' experience with the tools provided. For this reason, an exchange with pilots and information on their documentation and results will be necessary to monitor and assess the efficiency of the policy suggested.

Assessment of the Sustainability of the Policy

When assessing the policies impact, the partners will proceed as it follows:	
1	Schedule a Call with the assigned Pilot
2	Request an Overall Feedback and Pilot Status
3	Ask if any sustainable/environmental measure was put into practice. If the answer is yes, ask which specific measure(s) were taken. If the answer is no, ask why and move to Point 5.
4	Ask if they are aware of the impact these measures had: If the answer is "*yes*", ask how do they know (monitoring through KPIs, other evaluation methods). If the answer is "*no*", ask why they were not monitored (high costs, no time, relevance...).
5	Ask if, outside of the measures that were taken or not into account, they are aware of any "involuntary" environmental impact resulting from the pilot.
6	Ask about any relevant documents and reports illustrating that the pilot has a positive/neutral/negative sustainable impact.
7	After having collected all these data and reading the necessary documentation, the partners will write a short (1 page) report containing the above-mentioned information, and a short introductory paragraph on the Pilot itself.
8	Once the Report is completed, it will be added to the current file and compiled by the Task Leader (FE).

Table 1: Evaluation of the Sustainability of the Policies

Evaluation on Competition

Competitiveness is a cornerstone of policy and decision-making processes within the EU, ensuring the vitality of various industries. Across different sectors, the ability to remain competitive is essential for businesses to thrive. In fact, competitiveness is synonymous of sustainability and growth of enterprises, as those unable to keep pace risk to be excluded from the market. This could have deep negative consequences, impacting not only the employees' lives but also the broader economic landscape of the surrounding communities.

At a national level, the stakes are even higher. The competitiveness of industries represents a country's economic health. If a sector struggles to maintain its competitivity, the repercussions can be felt throughout the entire economy. The interconnectedness of industries means that a decline in competitiveness within one sector can lead to ripple effects, affecting employment rates, GDP growth, and overall economic stability.

Transitioning this discussion specifically to the agricultural sector, competitiveness takes on added significance. Agriculture represents a vital component of the economy, providing food security, employment opportunities, and contributing to national GDP. The competitiveness of agricultural enterprises directly impacts their ability to thrive in both domestic and international markets. Competitiveness ensures that farmers can effectively market their products, maintain profitability, and sustain their livelihoods. A lack of competitiveness can lead to decreased farm incomes, reduced investment in technology and infrastructure, and ultimately, hinder the sector's ability to meet evolving market demands.

According to the EC, the EU agri-food system is nowadays competitive and resilient. This acknowledgment reflects the sector's ability to withstand various challenges and adapt to changing market conditions. However, it's essential to recognize that resilience is not a static state; it requires ongoing efforts to maintain and improve.

Evaluating the competitivity of a Policy

When assessing the policies impact, the partners will proceed as it follows:	
1	Schedule a Call with the assigned Pilot*
2	Request an Overall Feedback and Pilot Status*
3	Ask if any specific measure which would allow the farmer's competitivity to increase was put into practice. If the answer is yes, ask which specific measure(s) were taken. If the answer is no, ask why and move to Point 5.

4	Ask if they are aware of the impact these measures had: If the answer is "*yes*", ask how do they know (monitoring through KPIs, other evaluation methods). If the answer is "*no*", ask why they were not monitored (high costs, no time, relevance...).
5	Ask if, outside of the measures that were taken or not into account, they are aware of any "involuntary" competitivity impact resulting from the pilot.
6	Ask about any relevant documents and reports illustrating that the pilot has a positive/neutral/negative impact on farmer's competitivity.
7	After having collected all these data and reading the necessary documentation, the partners will write a short (1 page) report containing the above-mentioned information.
8	Once the Report is completed, it will be added to the current file and compiled by the Task Leader (FE).

*All the Evaluation (Environmental, Competition, Environmental) can be done during one call

Table 2: Evaluation on Competitivity of Policies. Source: Own

Evaluation on the social impact

Before introducing the Evaluation of a Policy Social Impact, we need to start by giving a definition of the Social Impact. In Fact, as it is explained in detail in the Briefing "*Measuring social impact in the EU*", published in May 2017 by the European Parliament, the world does not have a unanimous definition.

According to the report and glossary prepared by the expert group on social entrepreneurship (GECES) at the Commission, social impact entails 'the reflection of social outcomes as measurements, both long-term and short-term, adjusted for the effects achieved by others (alternative attribution); for effects that would have happened anyway (deadweight); for negative consequences (displacement); and for effects declining over time (drop-off)'. Social outcomes stand for the social effect (change), both short- and long-term, influencing the target population.

In this context, measuring social impact is crucial as it helps decision–making bodies to produce more inclusive and precise policies.

Social Policies include:

- *Employment (including labor market standards and rights)*
  - *Income*
  - *Access to services (including education, social services, etc.)*
  - *Respect for fundamental rights (including equality)*

- *Public health and safety*

Ensuring the deep analysis and consideration of various aspects is essential to safeguarding the livelihoods and well-being of farmers while providing them with adequate services. When farmers perceive tangible benefits from a project beyond just monetary gains, they are more likely to engage with and trust the platform. This enhanced trust and satisfaction not only encourages their own continued utilization but also serves as a powerful incentive for others to follow.

Beyond mere financial considerations, farmers value initiatives that offer practical solutions to their everyday challenges, improve their overall well-being, and enhance their productivity and efficiency. This could involve access to essential services such as education, healthcare, and infrastructure, as well as support in adopting sustainable farming practices and navigating market complexities. Moreover, satisfied and engaged farmers become advocates for the project within their communities. This effect not only expands the project's reach but also creates a supportive ecosystem where farmers collaborate, share knowledge, and collectively benefit from the platform's offerings.

Evaluating the Social Impact of a Policy

When assessing the policies impact, the partners will proceed as it follows:	
1	Schedule a Call with the assigned Pilot*
2	Request an Overall Feedback and Pilot Status*
3	Ask if any specific measure which would allow for a better farmer's life quality was put into practice (e.g. Specific costs were reduced, participation in info sessions and courses were offered...). If the answer is yes, ask which specific measure(s) were taken. If the answer is no, ask why and move to Point 5.
4	Ask if they are aware of the impact these measures had: If the answer is "*yes"*, ask how do they know (monitoring through KPIs, other evaluation methods). If the answer is "*no*", ask why they were not monitored (high costs, no time, relevance...).
5	Ask if, outside of the measures that were taken or not into account, they are aware of any "involuntary" Social impact resulting from the pilot.
6	Ask about any relevant documents and reports illustrating that the pilot has a positive/neutral/negative impact on farmer's competitivity.

7	After having collected all these data and reading the necessary documentation, the partners will write a short (1 page) report containing the above-mentioned information.
8	Once the Report is completed, it will be added to the current file and compiled by the Task Leader (FE).

*All the Evaluation (Environmental, Competition, Environmental) can be done during one call

Table 3: Evaluation on Social Impact of Policies. Source: Own

2.4 Data Governance Survey

After having collected data on Sustainability, Competitivity and Social Impact, WP5 Pilots were asked to take part in a short survey focused on evaluating the Data Collection and Sharing Practices set in place in DIVINE.

The questions asked were the following:

Data Governance in DIVINE Pilots

1. *What Kind of data are you collecting and using?*
   - ❑ *Personal Farmers Data*
   - ❑ *Data Collected on the Field*
   - ❑ *Data From the Public Sector*
   - ❑ *Data From the Private Sector*
2. *Were you able to collect some data during Pilot Round 1?*
   - *Yes*
   - *Yes, Partially*
   - *No*
3. *Did you have any troubles in collecting the data ?*
   - *Yes*
   - *No*
4. *If you answered Yes to Q3, can you explain/describe the Problem(s)? If there were no issue insert -Required to answer. Multi Line Text.*

   Enter your answer
5. *Were the data Shared with someone (among farmers/with stakeholders...)?*
   - *Yes*
   - *No*
6. *Will you be sharing the data with someone (farmers/stakeholders...)?*
   - *Yes*
   - *No*

7. *Are there specific measures to guarantee the Privacy of Farmers - and the control over their data?*
   - ❑ *Yes, measures to guarantee privacy are in place*
   - ❑ *Yes, measures to guarantee Farmers have control over their data are in place*
   - ❑ *No, no such measure is in place*
8. *Do you have any farmer's feedback on the project - on their feelings towards their data being collected and shared? Write a few lines - explaining if NO, why, and if YES, what their feelings are.*

   Enter your answer

3. CHAPTER III – DATA COLLECTION

3.1 Exchanges with pilots

The first part of the following section includes the outcomes of the exchanges among Task 6.3 Partners' and their assigned Pilot. FE was in charge of discussing with UCD, ENG was associated with NP, CREA to ANALYSIS-DSC, and ICT with KZGS.

Pilot 1 – KGZS

Pilot Scope

The pilot will deliver a platform for benchmarking farming data between farmers for optimizing milk production and pork production. Based on this data the Advisory Service KGZS will be able to support the farmers more efficiently resulting in improved production and also having positive impact to farms carbon footprint.

It will be mainly carried out in Slovenia (Pomurje) in an area of 1,337 sq. km and a population of 116,500 people. Agricultural holdings of this region cultivate almost 13% of all agricultural land in Slovenia and raise almost 12% of all the livestock. Farmers from other regions will also be engaged in this pilot.

The main objective of the Pilot is to demonstrate that a data space driven pathway can transform the regional food production systems through systemic gathering, processing and interpretation of relevant data through the DIH AGRIFOOD Data Space - providing a secure, sovereign system of farming data sharing in which all participants can realize the full value of agricultural data. The uptake and improved use of data will result in data space driven, digitally transformed farming systems characterized by much better management of the complete sector, including improving farming practices, achieving greater transparency, sustainability, efficiency, reducing inputs, GHG emissions, food waste and losses throughout the entire value chain.

The pilot will be providing inputs for the governance model at the national level. Extension and reuse to arable farming, grassland, orchards, vegetable production and other livestock production types is possible by extending the approach by including new datasets and methodologies. Countries and regions across the EU don't have the same datasets available therefore the most efficient means of pilot reuse is knowledge transfer.

With the aim of establishing a long-term partnership centered on enhancing the environmental and economic outcomes on farms and in the area, the pilot works with farmers and farming advisers. While encouraging farmers to engage in these kinds of activities is not always simple, market competition as well as environmental goals are driving the engagement.

Sustainability:

In order to increase awareness and give farmers and advisers a technical instrument to track past production in relation to carbon footprint and make future decisions, the Pilot is evaluating the carbon footprint of the farms taking part in the study (Point 3):

- Through the use of the dataspace platform, farmers will be able to track their footprint and establish it did increase or decrease, thanks to the comparison to benchmarking values.
- Other eventual benefits (Point5) could derive from the Pilot deployment but, since the process is still in its early stages, no quantifiable results is available yet.

The Carbon Footprint KPIs should be available later on, once the second phase of the Pilots is completed. However, it is possible to assume that the environmental impact will be positive, as farmers and advisors are working together to optimize profits and costs, and by optimizing the resource usage the chemicals input will be reduced.

Competitivity:

Policies are currently being implemented to enable farmers to become more competitive (Point 3):

- Comparing one farm to others helps identify weak points and guide improvement actions. The primary purpose of developing benchmarking tools is to increase farmers' competitiveness. Farmers who have been attending the information sessions during multiple years will be able to show an improvement in their performance based on economic statistics and KPIs. At the moment and during the next Pilot rounds, farming performance results will be imported into a benchmarking program, where they can be displayed and will provide a preview of the potential benefits of taking part in the DIVINE Data Space.

Social Impact:

The social impact of the Pilot on farmers is not at the core of Pilot 1. The primary focus of the farmers' actions was determined during the benchmarking sessions. Nonetheless, even if KPIs were not established to monitor the farmers wellbeing, the project may indirectly positively impact the farmer's life quality. This sort of feedback will be obtained by comparing the performance and outcomes to baseline values from the next year on. Competitive local farming is predicted to provide regional goods that will be preferred by end consumers, thus improving local farmers' social standing.

Pilot 2 – UCD

Pilot Scope

Located at UCD Lyons Farm, Lyons Estate in Celbridge, Naas, Co. Kildare, Ireland, this pilot project aims to explore critical data sources available from both private and public sectors. By integrating these data sources, the project seeks to enhance decision-making capabilities within the crop production supply chain by predicting yields in the face of variable weather, diseases, and climate change, ultimately leading to enhanced yields.

The project will utilize the DIVINE data space to integrate internal and external datasets, enabling the development of yield prediction strategies to improve supply chain management. These services not only provide farmers with insights into crop developments in their region but also offer agri-tech providers an additional source of valuable information to enhance their decision support systems. Additionally, farmers will receive information on their carbon footprint and strategies to reduce it.

Sustainability:

The Pilot does not include Specific measures and KPI to evaluate its sustainability (Point 3)., even if some measures relating to the farmer's carbon footprint should be soon defined. On the other hand, indirect indicators (Point 5) suggest that utilizing certain technologies can lead to positive outcomes:

- Reduced Use of Fertilizers: By employing technology, it's possible to optimize fertilizer application, resulting in reduced chemical usage. This would lead to a positive environmental impact, promoting biodiversity conservation.
- Lower Diesel Consumption: Technology can help in managing resources more efficiently, leading to decreased diesel consumption. This, in turn, contributes to lower emissions and reduced pollution levels.

Regarding measurement methods, the absence of standardized metrics for sustainability poses a challenge. Without clear Key Performance Indicators (KPIs), it's difficult to gauge improvements or deteriorating conditions accurately. Nonetheless, tracking changes in fertilizer and diesel usage over time allows farmers to compare initial and final usage rates. Ideally, this should reveal a decrease in chemical and fuel consumption, indicating progress toward sustainability.

When it comes to existing documentation and data, while models may have been mapped out (during Pilot Round 1), they may not have been fully digitized. Consequently, at the current moment there is a lack of concrete data to verify whether sustainability has improved or worsened since the project's start. Only preliminary data from the project's outset is available, making it challenging to assess the true impact on sustainability.

Competitivity:

In Ireland, farmers typically don't actively engage in marketing their produce; rather, they operate as price takers within the market. Consequently, in the pilot program there isn't a tangible means to specifically evaluate a potential increase in competitiveness (Point 3). However, there are potential indirect benefits (Point 5) to consider:

- Firstly, the tools implemented will enhance farmers' efficiency by optimizing the use of fertilizers and pesticides – as mentioned above - ensuring they're applied only when necessary, thereby reducing costs.

- Secondly, following the recommendations generated from field monitoring will lead to healthier crops and increased yields, translating to higher profit margins and overall income for farmers.
- Moreover, the adoption of practices like crop rotation, coupled with the aforementioned efficiency measures, will increase farmers' resilience against various challenges (climate change, extreme weather events and others) they may face.
- Furthermore, the introduction of technology into the agricultural sector serves as an attractive incentive for individuals less familiar with the industry, including a younger population. This can facilitate easier integration into the agricultural world, addressing concerns related to an ageing population within the sector while fostering higher levels of innovation, subsequently enhancing competitiveness.

It's important to note that while these potential benefits are highlighted, concrete data to support these assertions is currently unavailable, due to the same reason mentioned in the Sustainability section. A clearer overview and updated data should be available after Pilots' Round 2.

Social Impact:

The implementation of the Pilot's objective will bring multiple practical benefits to farmers, making their lives easier and less stressful.

- By automating tasks like field measurements, farmers will save time and effort. This means they would not have to spend as much time physically working in the fields, allowing them to focus on other relevant activities.
- Moreover, the tools developed will help reduce costs for farmers, as they no longer need to invest in manual measurement tools or spend money on fuel and labor for those tasks. This increased efficiency not only saves money but also enables farmers to achieve a better work-life balance. They would be able to spend more time with their families or pursue hobbies and interests outside of farming.
- Another advantage is that the introduction of this technology can attract younger people and newcomers to the farming sector. With advancements in technology, farming becomes more appealing and accessible to a wider range of individuals. This could bring fresh ideas and perspectives to the industry, driving innovation and growth.

As was the case for Sustainability and Competitivity, the UCD does not put in place specific measures to promote and monitor its Social Impact (Point 3). Nonetheless, multiple indirect advantages will result from the Irish Pilot's implementation. Some first results should be visible and measurable after the second pilot's deployment.

Pilot 3 - NP

Pilot scope

Pilot 3 focuses on the production and monitoring of crops of olives and grapes and aims to enable agricultural data collection and data sharing in support of close-to-real time farm performance benchmarking and CAP indicators monitoring. The type of users that is considered that will benefit from

these data products are Farmers, Farm Advisors and Policy makers. In detail, this pilot project will employ Gaiasense, a commercially available Farm Management Information System (FMIS) widely used, particularly in Greece. Additionally, a platform for aggregating and sharing data to compute performance indicators almost in real time will be developed, utilizing DIVINE's data-sharing mechanisms. Sample indicators include types of cultivated crops, farming practices employed (e.g., crop rotation, ploughing), quantities of fertilizers and pesticides applied (per hectare), irrigation volumes (per hectare), and harvested yields (per hectare).

Having completed the first round of the pilots, the necessary data is existent and its implementation into DIVINE's platform is scheduled for the near future.

Sustainability

There are no specific indicators or KPIs in this pilot, in order to measure sustainability impact (Point 3), but the data gathered during the pilot phases can serve as indirect indicators (Point 5). For example, by utilizing gaiasense, NP's technology, and the data it provides, farmers can develop better strategies to:

- Reduce water waste from irrigation;
- Reduce excessive use of fertilizers.

The data gathered also helps with resource management regarding agricultural equipment leading to lower, more efficient use of equipment, which may result in:

- Lower, less frequent maintenance,
- Less diesel consumption

Thus, the deployment of the Pilot will be able to generate a positive impact on global sustainability, by reducing significantly emissions and pollution levels.

Unfortunately, due to the lack of direct measurement methods and documentation focused on sustainability, it may be challenging to prove the actual impact of DIVINE's pilot 3. On the other hand, by providing historical data gathered from NP's database containing various indicators (irrigation levels production levels etc.) the Pilot may provide a useful tool working as a baseline for future comparison and justification.

Competitivity:

In Pilot 3, the current structure does not include KPIs or measures designed to monitor an increased competitiveness among farmers (Point 3). At the moment, data collected within the pilot is confined to circulation solely between the NP and individual farmers. Without broader sharing mechanisms in place, such as benchmarking initiatives, there are few ways for farmers to compare their performance or strategies with others in the network.

One conceivable scenario for promoting competitiveness could emerge if farmers who have not adopted GaiaSense technology observe superior outcomes among their counterparts who have embraced it. Indirectly, the main advantages of using Gaia sense may be:

- More efficient production,
- Reduced input costs

However, it's important to note that any such observations would likely relate more to the commercial efficacy of the technology rather than direct outcomes of the pilot itself. Consequently, while there may be indirect implications for competitiveness within the farming sector, they fall outside the direct purview of the project's objectives.

Thus, without robust documentation and data analysis specifically focused on competitiveness, it becomes challenging to assess and address this aspect within the framework of the project. Therefore, enhancing competitiveness among farmers may require additional strategies or initiatives beyond the current scope of the pilot.

Social Impact:

It is an undisputed fact that this Pilot creates multiple opportunities for the improvement of farmers' daily routines as it promotes:

- The automation of monitoring processes usually required direct, manual work from the farmer's side.

Consequently:

- Automation reduces individual fatigue,
- Lowers employment costs,
- Improves work-life balance of both employers and employees on a farm,
- Modernizes a working sector which has always been maybe too traditional now promoting innovation and technological developments.

As far as the documentation or measurements are concerned, after the first Pilot Round data are not available. Clearer information will result from the second Pilot Round.

Pilot 4 - ANALISIS-DSC

Pilot Scope

The pilot focuses its efforts on the potential increase in qualitative and quantitative performance in farms due to data sharing, levering the effectiveness and efficiency of data sharing application to fuse multiple source data. The core objective of the pilot is to showcase how a data-driven approach can transform for the better the lives of farmers, therefore improving the quality of life in rural communities that are continuously facing decline year after year, providing them with access to real- time information about weather conditions, soil health and crop conditions.
The use case takes place in a 100 Ha organic farm at southern Spain, between La Peza and Diezma (Granada, Andalusia). The farm has traditional olive and almond orchards, rotational crops and pastures for livestock.

The pilot uses and analyzes its own datasets from its own weather station and IoT sensors, and also weather information from meteorological stations covering the whole Andalusia area, which is the largest region in Spain, with an area of 87,599 Km2 and a population of 8.5 million people in 2023. Also analyzes satellite NDVI imagery from Sentinel 2 and other public data sets like the Copernicus Data Space Ecosystem.
The pilot project's competitiveness lies in its comprehensive data collection and integration strategy. By utilizing a combination of data sources, including:

- Own meteorological station: Provides high-resolution, localized data on weather conditions, including evapotranspiration, UV radiation and other relevant parameters.
- IoT sensors: Continuously monitors soil moisture, temperature, and leaf wetness, enabling real-time tracking of soil and plant water status.
- RIA network of meteorological stations: With over 100 meteorological stations, expands the spatial and temporal coverage of climate data in Andalusia region, allowing for a broader understanding of regional climate variations.

This multi-source data approach ensures a comprehensive understanding of the environmental conditions affecting crop water needs. There will also be models to help on trend, variability, correlation, and causality analysis.

The project's competitiveness is further enhanced by the development and implementation of five advanced satellite image models, primarily utilizing NDVI data:
NDVI Super-resolution Model: Significantly improves the resolution of NDVI images, enabling more precise identification of terrain features and vegetation cover.
Soil Organic Carbon Estimation Model: Estimates soil organic carbon levels using satellite imagery, a crucial indicator of soil fertility and water retention capacity.
Vegetation Classification Model: Differentiates trees from other vegetation and assesses their health status, critical information for forest management and environmental conservation.
NDVI Forecasting Model: Predicts NDVI values for grassland five days in advance, allowing for proactive irrigation scheduling, water management and grass clearing activities.
Decision Support System: Integrates all data sources and model outputs to provide real-time decision support for various agricultural practices, including:
Grass weeding: Optimizes timing and intensity of weed control measures.

Irrigation: Schedules irrigation events at the most opportune time and with the precise amount of water required.
Soil health management: Identifies areas requiring additional soil amendments or conservation practices.
This suite of satellite image models provides valuable insights for optimizing agricultural practices and enhancing resource efficiency.
There will also be models to help with trend, variability, correlation and causality analysis.

Sustainability

Evaluating the pilot's impact on sustainability presents a significant hurdle. This is due to the lack of established measurement methods and documentation focused on this area. Consequently, there is currently an absence of concrete data to definitively demonstrate whether sustainability has improved or declined since the project began. Currently, only preliminary data from the project's launch is available, which further hinders a comprehensive assessment.

Despite these challenges, the pilot offers a valuable opportunity to establish a baseline for future sustainability measurement. By providing historical data from various sources, including the pilot weather station, IoT sensors, Sentinel 2 imagery, and the weather station network database, the pilot and the applications developed within the DIVINE project can serve as a crucial reference point for future comparisons.

This data can be used to assess the pilot's potential long-term impact on sustainability in several areas, such as:

- Reducing the quantity of irrigation water: Data on weather patterns and soil moisture can inform irrigation strategies that minimize water usage.
- Alleviating the effects of leaching (lixiviation) of nitrates and other minerals, leading to better mineral levels and reduced fertilization needs: Sensor data can help track organic carbon levels in the soil, allowing for more targeted fertilization practices. It is important to mention that the leaching of nitrates into the subsoil can contaminate subway aquifers, creating serious health problems if water rich in nitrates is consumed.
- Incorporating the maximum level of biological residues into the soil through timely clearing and chipping of pruning branches. Data on weather conditions and plant growth cycles can guide clearing activities to optimize the decomposition of organic matter in the soil. Also, it will be helpful reducing on herbicides on non-organic farms.
- Reducing labor weeding inputs and fossil fuel consumption: Improved monitoring of soil health and crop growth can lead to more efficient weed control methods, potentially reducing reliance on manual labor.

This data will allow for a more robust evaluation of the pilot's long-term impact on sustainability once standardized measurement methods are established.

Competitivity

The combined impact of the comprehensive data collection and advanced satellite image models is expected to yield significant benefits, including:

- Reduced water consumption: By optimizing irrigation timing and quantity, water usage can be minimized, leading to water conservation and cost savings.
- Improved crop productivity: Precise water management and soil health monitoring promote optimal crop growth and yield enhancement.
- Reduced environmental impact: Minimizing water usage and fertilizer application reduces the environmental footprint of agricultural activities.
- Enhanced decision-making: The decision support system empowers farmers to make informed and timely decisions, leading to more efficient and sustainable agricultural practices.

Beyond the previous points, the pilot project's competitiveness is further strengthened by:

- Addressing critical challenges: The project tackles pressing issues in agriculture, such as water scarcity, soil degradation, and climate change.
- Contributing to sustainable agriculture: The focus on efficient water management, soil health improvement, and biodiversity conservation aligns with sustainable agriculture principles.
- Promoting innovation and technology adoption: The project showcases innovative technologies and demonstrates their potential to transform agricultural practices.

The pilot project's competitiveness stems from its comprehensive approach to data collection, advanced satellite image models, and expected benefits. By addressing critical challenges, promoting sustainable agriculture, and fostering technology adoption, the project positions itself as a frontrunner in innovative and sustainable agricultural practices.

Social Impact

There are no specific indicators or KPIs in this pilot, in order to measure social impact, but the data gathered during the pilot phases might end up providing some indirect indicators.

4. CHAPTER IV - Comparison of Pilots and Barriers

The first section of this chapter will focus on comparing the results and answers obtained from each pilot.

4.1 Face to Face Meeting

The table below will show an intuitive recap of the main answers given by the questioned pilots:

Questions Asked	Pilot 1 KZGS	Pilot 2 UCD	Pilot 3 NP	Pilot 4 ADSC
Is any specific measure/KPI established to measure the policies and the project sustainability?	YES	NO	NO	NO
If yes, can you provide concrete results?	NO	NO	NO	NO
Is there an indirect impact of the Pilot on sustainability?	YES	YES	YES	YES
If yes, can you provide concrete results?	NO	NO	NO	NO
Are there any other comments or information on Sustainability you can give?	Some data on carbon footprints will be available after Pilots Round 2.	Too early to talk about results, only baseline values have been collected.	Some data may be available after Pilots Round 2.	The data collected from the sensors can be used as future benchmark
Is any specific measure/KPI established to measure the policies and the project potential increased competitivity?	YES	NO	NO	NO
If yes, can you provide concrete results?	NO	NO	NO	NO
Is there an indirect impact of the Pilot on	YES	YES	YES	YES

competitivity?				
If yes, can you provide concrete results?	NO	NO	NO	NO
Are there any other comments or information on the Pilot Competitivity you can give?	The benchmark results will only be visible after the completion of the next pilot rounds.	Too early to say if the results will be positive – these evaluations may require a much longer time span.	Competitivity depends on how the tools are advertised, not part of the main focus of the Pilot.	The data collected from the sensors can be used as future benchmark
Is any specific measure/KPI established to measure the policies and the project Social Impact?	NO	NO	NO	NO
If yes, can you provide concrete results?	NO	NO	NO	NO
Is there an indirect impact of the Pilot on Social Impact?	YES	YES	YES	MAYBE
If yes, can you provide concrete results?	NO	NO	NO	NO
Are there any other comments or information on Social Impact you can give?	Not at the core of the Pilot, there may be indirect results later on.	Results will be available after the next Pilots Round.	Results will be available after the next Pilots Round.	Potential Benefits may be highlighted later on.

Table 4: Pilot's Answers on Policy Sustainability, Competitivity and Social Impact. Source: Own

After categorizing the four Pilots' answers, it becomes evident that the performance of the four of them exhibits positive trends across the three examined aspects, despite the absence of specific quantitative measures or KPIs to meticulously monitor their progress in the field.

While it is true that most of the Pilots lack specific KPIs for monitoring results, they nonetheless demonstrate a multitude of "indirect" effects that extend beyond the primary scope of the pilots. These indirect effects encompass various dimensions, including socio-economic impacts, environmental considerations, and technological advancements, all of which contribute to the broader objectives of the projects.

However, the complexity inherent in monitoring these effects presents a significant challenge. This complexity arises due to several factors, including the time required for observable outcomes to materialize and the preliminary nature of the results currently available. It is, in fact, necessary to remind the reader that this document will be delivered on M19 – after only the first Round of Pilots has been concluded. Additionally, the duration of the project, which is expected to be concluded in September 2025, poses constraints on the feasibility of generating concrete results that can be extrapolated to a larger population or scaled up for broader implementation.

Furthermore, the absence of precise KPIs tailored to monitor the three examined aspects further complicates the monitoring and evaluation process. Without clear benchmarks or metrics in place, assessing the efficacy and impact of the pilots becomes a nuanced endeavor, relying heavily on qualitative assessments and anecdotal evidence.

Overall, the global expectation over sustainability can be summarized as it follows:

All the projects aim at promoting technology and data usage in agriculture. Even indirectly, the take up of the DIVINE tools will:

- Reduce Use of fertilizers and thus chemicals;
- Reduce Waste;
- Reduce water consumption
- Reduce leaching of nitrates on subsoil waters
- Improved soil health
- Increase in biodiversity
- Reduce the movement of farmers, thus lowering diesel consumption;

On the other hand, when it comes to competitivity:

- As less fertilizers will be used, savings will be possible;
- Optimization of means of production will allow for a higher production;
- Through digitalization of the sector, more young people will be attracted and enter the market;

And, with regards to social Impact:

- More time will be saved and thus dedicated to other activities
- Sector Digitalization and young people will promote a generational change, introducing new visions and ideas

4.2 Survey Responses

Despite these challenges, the initial pilot rounds have not encountered any major issues related to data sharing and access. This smooth integration of data-sharing mechanisms underscores the effectiveness of the collaborative frameworks established within the projects, facilitating seamless communication and knowledge exchange among stakeholders.

In order to reach this conclusion, the four Pilots were asked to take part and fill in a "Data Governance Survey", the questions of which can be found in Section 2.4, and at the following Link.

Questions regarded different points tackled in D6.1 and 6.2, allowing for the evaluation on the Data Governance model presented and for possible revisions and improvements.

As survey Starting point, the first question asked related to the nature of the data the Pilots were using. As extensively explained in D6.1, the type of data employed determines its specific characteristics and the rules governing its sharing and utilization. As highlighted in the Image below, multiple data types and sources are used. 3 Pilots out of 4 use their own collected data, two use Personal Farmers data and integrate them to Data coming from the public sector.

Figure 2: Survey Answers

Following Q1, Pilots were required to follow up on the results after the completion of their first round. Overall, all pilots could collect data – and met no issues with it. One of the four pilots collected partial data only, but that was due to meteorological and seasonal issues, rather than a malfunctioning of the system or inappropriate policies, as is demonstrated by the fact that no Pilots answered "YES" to Q3 "Did you have any trouble collecting the data?".

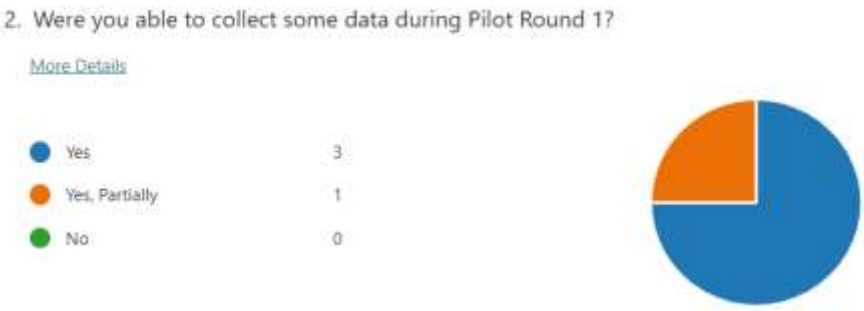


Figure 3: Survey Answers

The following questions related to the regulation and data access, management, use and sharing practices; 2/4 Pilots have already started sharing data among farmers and stakeholders, while the 4 of them replied that, even if some data have not been shared yet, they plan to do so during the next Rounds. All answered that multiple measures are been put into place in order to ensure the safety and protection of farmers' data. Overall, ¾ Pilots have set up measures to deal with the data privacy, and also ¾ have set up measures to allow farmers to control their data.

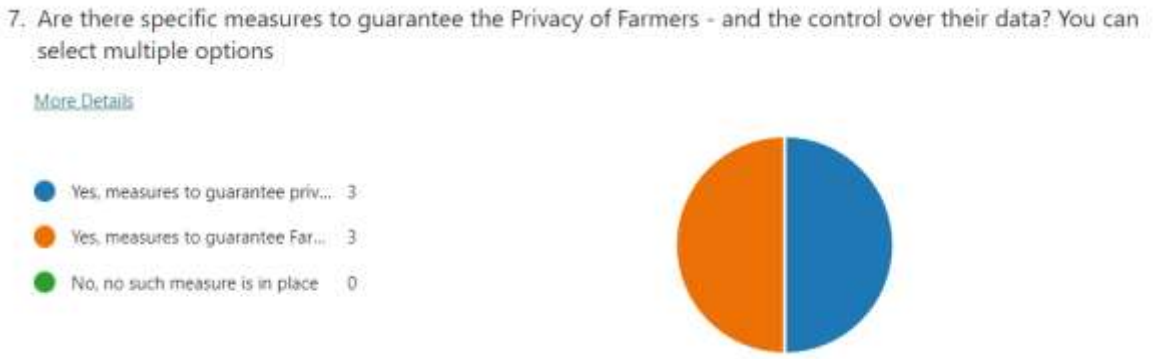


Figure 4: Survey Answers

Thus, in conclusion, no major issue which would hinder DIVINE scope was highlighted. During the First Round, all the different actors and farmers took part in the project, and proper and necessary data were collected.

On the other hand, if the project is not facing challenging-g issues, Pilots expressed their concerns over the possible lack of farmer's trust, as shown by the table below:

N.	Responses
1	*Yes. The farmer feels that the concept idea is very promising for the farmer's needs.*
2	*No, there has been no formal feedback yet except for the survey carried out in early 2023. This will be further considered with the roll out of the DIVINE platform. Anecdotal evidence shows that farmers are hesitant to share all of their data. They would prefer to have full control of their data and only share specific data points/ datasets. There is a lack of trust between third parties and farmers want to ensure that third parties are not profiting from their data with no benefit for themselves.*
3	*Participating farmers are OK with sharing the data if they are anonymized and used for the purpose of benchmarking organized by advisory service KGZS.*

4	*They are inclined to help with the project, though as usual, they are not that positive to the sharing of data, due to the sheer amount of competitiveness in this field.*

Table 5: Pilots Concerns

4.3 Highlighted Barriers

In the initial round of feedback gathered through face-to-face interactions, there hasn't been any notable negativity identified that might pose obstacles to sustainability, competitiveness, or social impact. However, it's worth noting that several responses from the pilots underscored the lack of a robust system for tracking key performance indicators (KPIs)or implementing a monitoring mechanism in these three fields. This absence of a tangible framework could potentially give rise to unforeseen challenges in the future.

When there aren't clear KPIs or a monitoring system set up, it's tough to measure how well our initiatives are working and track progress accurately. This lack of insight into performance metrics could make it hard to make informed decisions and tweaks, which might end up holding back the project's success. So, even though the initial feedback didn't flag any immediate problems, it's crucial to fill this gap in monitoring and evaluation to make sure our initiative stays effective in the long run and has a real impact.

On the other hand, the Pilot's Survey has called for further considerations worthy of attention. While overall data collection didn't encounter significant obstacles, the feedback from two pilots raised a relevant issue: despite existing measures aimed at safeguarding farmers' privacy and rights, there's a certain reluctance among them to share their data openly. Their participation seems primarily driven by their dedication to the project rather than a genuine trust in third parties handling their data. Many farmers have expressed a strong preference for exercising greater control over their data, indicating a fundamental concern regarding data ownership and management.

Farmer's Trust

The challenge of establishing trust among farmers to share their data within the DIVINE data space represents a significant issue. The fear of excessively sharing information is not limited to this project alone; across the world, citizens tend to be careful of which traces they leave on the web, and farmers, by nature, are generally cautious about sharing their data. This hesitancy derives from a perceived lack of control over what happens to their information once it's shared.

This implies an increased DIVINE effort in:

Tailoring and simplifying the current regulation, providing clear and easily understandable policies;

Adapt the policies to the specific needs of farmers, to increase their trust and promote the DataSpace take up;

Advertising and explaining the safety and privacy measures established, in order to help farmers understanding how their data are processed and how they have data sovereignty.

The last point implies that addressing this issue requires more than just refining policies. While policy improvements are necessary, they must be accompanied by comprehensive information sessions and clear explanations about the handling of their data. The reluctance to share data runs deep, especially among farmers who may not have a background in policy or technology. Consequently, there's a need to bridge the gap between technical details and farmers' understanding, ensuring they feel comfortable and informed about the data-sharing process.

This challenge is then taken into account for thorough exploration in the forthcoming 6.4 deliverable, where the emphasis will be on fortifying farmers' trust in the project. While robust measures are already in place to protect data integrity, there's a recognized necessity for a more accessible and transparent explanation of how the platform operates in practical terms and, crucially, how it guarantees the safety and confidentiality of farmers' data. By furnishing a simplified yet comprehensive overview, DIVINE's aim not only to tackle farmers' concerns but also to empower them with the knowledge and confidence necessary to trust the project.

This proactive approach to addressing concerns around data privacy and security not only underscores DIVINE's commitment to transparency and accountability but also serves to cultivate a deeper sense of partnership and collaboration between farmers and the project. By fostering an environment of mutual trust and understanding, we pave the way for sustained engagement and meaningful impact, thereby fortifying the project's long-term sustainability and effectiveness in driving positive change within the agricultural sector and beyond.

5. CHAPTER V - Policy evaluation and Lessons Learned

Policies often serve as the framework within which technological tools are deployed and utilized in agriculture. However, these policies may not always directly address the concerns and needs of farmers. While policies are essential for governing the implementation of tools, they might not resonate with farmers or provide clear guidance on how to navigate the technological landscape effectively. To address this gap, it is imperative to consider adapting policies to specific use cases and translating them into easily understandable language. By doing so, policymakers can ensure that policies are not only relevant but also accessible to farmers and other stakeholders involved in the adoption process. DIVINE's objective is to bring greater clarity, transparency, and trust in the policy framework governing agricultural technology adoption.

As mentioned in the previous sections, no extremely critical issue has been highlighted. The Regulations analyzed in D6.1 and D6.2 have been recognized as appropriate for DIVINE’s scope, and do not seem to hinder the project. On the other hand, the survey has highlighted the critical role of policy in building and maintaining farmer trust.

However, it is necessary to remind that trust is not solely dependent on the governance model of data but also on the dissemination of information related to policies and regulations. Therefore, there's a need to review existing policies (as outlined in Deliverables 6.1 and 6.2) to clarify and simplify them.

It is imperative to recognize that trust is derived from multiple factors, depending also on transparency and understanding. Therefore, it will be necessary to further refine the governance structures governing data while simultaneously enhancing the accessibility and comprehension of the used policies and regulations. As delineated in Deliverables 6.1 and 6.2, this review process served not only to clarify ambiguities but also to promote the simplification of the regulations (which will be developed in D6.4), fostering a positive environment for compliance and, ultimately, for building trust.

Nonetheless, an increased trust in the project does not depend solely on policy amelioration: it is equally important to acknowledge the different digital literacy levels among farmers and agrifood stakeholders. For those without a high level of digital proficiency, navigating through complex regulatory frameworks can prove to be an insurmountable challenge, rendering even the efficient policies a bureaucratic burden.

To mitigate this disparity and reduce the digital divide, DIVINE must invest in the development and deployment of usable technological solutions tailored to the policies and to the specific needs and capabilities of end-users. By making technology more accessible and user-friendly, DIVINE will not only alleviate the administrative burden but also empower stakeholders to visualize the regulatory landscapes with confidence and efficacy.

This includes translating complex policy language into easier terms and ensuring that farmers can easily understand their rights, obligations, and the implications of policy decisions on their day-to-day operations. By fostering a collaborative approach to policy formulation and implementation, DIVINE can create a more pragmatic model that addresses the real-world challenges faced by farmers and accelerates the adoption of innovative agricultural tools.

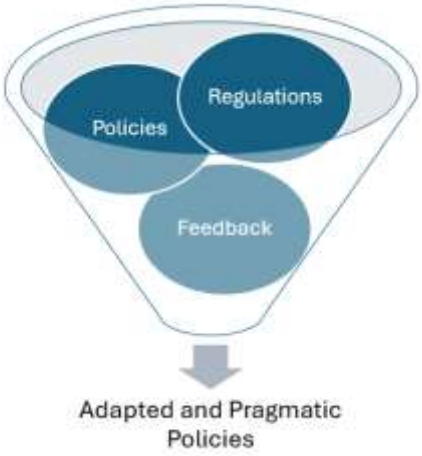


Figure 5: Future D6.4 work

6. Conclusion

In summary, the assessment of the four pilots reveals positive trends across sustainability, competitiveness, and social impact, despite the absence of specific quantitative measures or KPIs to meticulously monitor progress. The pilots demonstrate indirect effects that extend beyond their primary scope, such as socio-economic impacts, environmental considerations, and technological advancements, all contributing to the broader project objectives. However, while the initial feedback didn't raise immediate concerns, it's essential to address the lack of clear KPIs and monitoring systems. Without these, measuring the initiatives' effectiveness and tracking progress accurately becomes challenging, potentially hindering the project's success in the long run. Therefore, there is a critical need to establish a robust framework for monitoring and evaluation to ensure the initiative remains effective and impactful.

Additionally, the pilot survey highlighted a farmers' reluctance to openly share their data, despite existing measures to safeguard their privacy and rights. This reluctance underscores a fundamental concern regarding data ownership and management. While the project has measures in place to protect data integrity, there's a recognized need to address farmers' concerns and build trust in the project's data handling practices.

This challenge will be thoroughly explored in the forthcoming deliverable, with a focus on fortifying farmers' trust in the project. The emphasis will be on providing transparent explanations of how the platform operates and guarantees the safety and confidentiality of farmers' data. By empowering farmers with knowledge and confidence, the project aims not only to address concerns but also to foster a deeper sense of partnership and collaboration.

This proactive approach to addressing data privacy concerns not only demonstrates the project's commitment to transparency and accountability but also lays the groundwork for sustained engagement and meaningful impact. By cultivating an environment of mutual trust and understanding, the project aims to fortify its long-term sustainability and effectiveness in driving positive change within the agricultural sector and beyond.