



Delivering soil improvers from circular food production processes to boost soil health

Deliverable 5.1

Stakeholder matrix and description

25/05/24 Version 1.0

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Public



**Funded by
the European Union**

Funded by the European Union under the Horizon Europe Programme, Grant Agreement No. 101112855 (DeliSoil). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or Research Executive Agency (REA). Neither the European Union nor the granting authority can be held responsible for them. Swiss partners (FiBL) have received funding from the Swiss State Secretariat for Education, Research and Innovation (SERI).

DOCUMENT INFORMATION

Grant Agreement	101112855
Project Acronym	DeliSoil
Project Title	Delivering soil improvers through improved recycling and processing solutions for food industry residues streams
Deliverable Number	D5.1
Work Package Number	WP5
Deliverable Title	Stakeholder matrix and description
Lead Partner	Mineral and Energy Economy Research Institute of the Polish Academy of Sciences, [MEERI]
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Due Date	31.05.24 (M12)
Submission Date	31.05.24 (M12)
Dissemination Level	PU - Public
Type of Deliverable	R - Report

Version	Summary of Changes
V0.1	<ul style="list-style-type: none">• April 2024, Magdalena Andrunik (MEERI)• Not yet validated by the DeliSoil consortium
V1.0	<ul style="list-style-type: none">• May 2024, Magdalena Andrunik (MEERI)• Added feedback from DeliSoil partners• Ready for submission

EXECUTIVE SUMMARY

The report presents the stakeholder analysis within the context of the DeliSoil project, aiming to understand and navigate the intricate network of relationships that influence the soil improvers sector. Drawing from diverse sectors and utilizing the Quadruple Helix Model as a guiding framework, the analysis sheds light on the multifaceted nature of stakeholders and their roles in shaping project outcomes.

Report emphasizes the importance of stakeholder analysis in contemporary organizations, emphasizing its efficacy in mitigating risks and enhancing project outcomes. Within the soil improvers sector, stakeholder analysis becomes crucial for understanding the diverse range of actors involved, including policymakers, researchers, agricultural practitioners, and industry representatives. The adoption of stakeholder analysis is seen as essential for facilitating informed decision-making and strategic planning. Utilizing a survey-based method, the analysis aimed to assess the importance and influence of various stakeholder groups within the soil improvers sector. Through a detailed survey questionnaire distributed among project partners and external experts, the analysis sought to capture insights into stakeholders' interests, needs, and levels of engagement.

The survey analysis provides a detailed demographic information collected from respondents, offering insights into the gender distribution, age demographics, educational backgrounds, professional experiences, and organizational affiliations of survey participants. Demographic data serves as a foundation for understanding the representativeness of the sample and segmenting respondents into distinct groups based on their characteristics. The stakeholder matrix is a visual representation of stakeholder analysis within the DeliSoil project. The matrix categorizes stakeholders based on their levels of importance and influence, highlighting key individuals and groups that hold noteworthy influence over project outcomes. Through this analysis, stakeholders are grouped into four main categories: "Keep Satisfied," "Manage Closely," "Monitor," and "Keep Informed," each representing varying degrees of importance and influence.

Finally, key stakeholders within the DeliSoil project across the Quadruple Helix Model were determined. Stakeholders are categorized into four main groups: science, policy, industry and producers, and civil society. Each group plays a unique role in driving innovation, shaping policies, and fostering societal change within the soil improvers sector. In conclusion, the report underscores the importance of stakeholder engagement in advancing sustainable soil management practices within the soil improvers sector.

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1. INTRODUCTION

In today's organizations, stakeholder analysis is crucial for understanding and navigating the complex webs of relationships that shape projects, policies, and initiatives. Its application involves diverse sectors, from governmental organizations and regulatory bodies to enterprises and media entities. The adoption of stakeholder analysis has become pervasive, reflecting its efficacy in mitigating risks and enhancing project outcomes (Reed *et al.*, 2009).

The soil improvers sector stands to benefit significantly from the systematic evaluation of stakeholders. Recognizing the multifaceted nature of stakeholders and their varying degrees of influence, stakeholders encompass a broad spectrum of actors, including policymakers, researchers, agricultural practitioners, environmental advocates, and industry representatives. The necessity for project management teams to conduct thorough stakeholder analyses to gain nuanced insights into their operating environment, thereby facilitating informed decision-making and strategic planning is widely emphasised (Brugha and Varvasovszky, 2000). At its core, stakeholder analysis is designed to determine the interplay between projects and their stakeholders, shedding light on roles, power dynamics, and resource allocations. It underscores the role of stakeholder analysis in identifying key stakeholders and establishing priorities, laying the groundwork for devising robust engagement strategies crucial for fostering productive relationships and achieving project objectives (Kennon *et al.*, 2009).

Stakeholder analysis is typically conducted at the initial stage of project definition to comprehend their value systems, interests, and needs, and to ascertain the impact that public decisions have or may have on them. This analysis provides an understanding of the balance of forces within the project and serves as the foundation for decisions regarding project planning and implementation. The subsequent step in project implementation or ongoing business activities involves communication and continuous consultations with stakeholders.

As outlined by Brugha and Varvasovszky (2000), the process may vary in complexity and scope, depending on the project timelines, resource constraints, and geographic scales. From local initiatives to international endeavours, the depth of analysis and stakeholder engagement strategies must adapt to contextual nuances, ensuring relevance and effectiveness. Moreover, the methodology employed in stakeholder analysis continues to evolve in response to the dynamic landscape of project management. As stakeholders wield considerable sway over project success, a myriad of stakeholder analysis methods has emerged, aimed at deciphering stakeholder interests, influence, and potential contributions or threats to project outcomes.

Taking into account these considerations, this report delves into stakeholder analysis within the waste-based soil improvement domain. Drawing from the viewpoints of DeliSoil project partners, Living Labs partners, and external experts, this report synthesizes the responses into a stakeholder matrix, facilitating the identification of key stakeholders for the DeliSoil project.

2. METHODS

The analysis of stakeholders in the DeliSoil project facilitated the identification of the most important entities across all sectors connected to the project's scope. This stakeholder analysis was conducted based on the results obtained from a survey using the CAWI (Computer Assisted Web Interview) method. The survey was conducted online between August and November 2023, utilizing Survio.com, a tool for creating online surveys. The study, employing the survey questionnaire method, aimed to analyse the "importance and significance" versus the "influence and actual interest" of each group of stakeholders involved in the waste-based soil improvers sector.

Titled "Analysis of Stakeholders in the Soil Improvers Sector," the survey comprised nine questions, with seven of them being demographic questions (Annex 1). Seventy-four respondents participated in the study, and the survey was conducted in English. The survey was distributed among the DeliSoil partners, Living Labs partners, as well as internal and external experts. Finally, the obtained research results were interpreted and combined with existing knowledge to yield valuable conclusions. The first step in preparing the survey was to develop a detailed list of stakeholders within the DeliSoil project. This list was compiled based on discussions with DeliSoil partners and external experts with expertise in the field.

The following groups of stakeholders were included in the survey:

- Consumers
- Civil society
- Local society
- Non-profit organizations (NGOs)
- Farmers
- Agricultural associations
- Media
- Food and beverage producers
- Fertiliser producers
- Soil amendments producers
- Waste management facilities
- Scientists
- Education sector
- Research and development sector
- Financial investment institutions
- Research funding agencies
- Policy makers (international level)
- Policy makers (national level)
- Policy makers (regional level)
- Industry regulators (wastewater quality, noise, sludge quality)
- Health and safety inspectors & Controlling institutions
- Government officials
- National Sectoral networks
- Regional Sectoral networks
- International Sectoral networks

3. SURVEY ANALYSIS

3.1. DEMOGRAPHIC INFORMATION

Metric questions, also known as demographic questions, are crucial for proper survey analysis. Demographic information helps to assess the representativeness of the sample. A representative group refers to a sample of individuals that accurately reflects the characteristics of the larger population from which it is drawn. In survey research, the goal is to gather insights and draw conclusions that can be generalised to a broader population. Achieving a representative sample is crucial for ensuring that the survey results accurately reflect the opinions, attitudes, behaviours, and demographics of the population of interest. The metric part of a survey, which typically includes questions about demographic characteristics such as age, gender, education, etc., plays a central role in ensuring the representativeness of the sample. By collecting demographic information from survey respondents, researchers can assess whether their sample adequately represents the population they are studying. This ensures that the survey results are credible and can be generalised to the broader population.

Moreover, metric information allows for segmentation of respondents into distinct groups. Segmentation enables the analysis of responses based on different demographic characteristics, aiding in understanding how distinct groups perceive or respond to survey questions differently. By analysing responses based on demographic variables, patterns and trends that might not be apparent when looking at overall survey results can be identified. It can be found if certain groups have significantly different opinions or preferences, or that there are differences in attitudes towards certain topics. Overall, including metric questions in surveys is essential for gaining a comprehensive understanding of respondents and their perspectives, enabling more informed decision-making and effective strategy development.

The demographic data analysis indicated that the majority of respondents identified as females (55.4%), with 41.9% identifying as males. A small proportion (2.7%) opted not to disclose their gender, while none selected the "other" category (Figure 1). When conducting the study, interviewers aimed to maintain gender equality among respondents for several reasons:

- *Representativeness*: Ensuring a similar number of male and female respondents enhances the reflection of society and ensures the representativeness of the research sample. This, in turn, enhances credibility and allows for more accurate conclusions to be drawn about the entire population.
- *Avoiding bias*: Gender equality in the study helps to mitigate potential biases or distortions resulting from the dominance of one gender over the other. Significant overrepresentation of one gender may influence survey results due to differences in life experiences, views, or preferences.
- *Availability of different perspectives*: Introducing gender diversity allows interviewers to gain a more comprehensive understanding of respondents' opinions and behaviours by accessing a variety of perspectives.
- *Ethics and justice*: Maintaining gender equality in survey research is an ethical imperative based on the principle of justice and equal treatment of all research participants. Striving for gender equality aligns with pro-social activities that promote honesty and respect towards all individuals.

Regarding age distribution, the largest segment of respondents fell within the 35 to 49 age group, constituting nearly 40% of the total. Additionally, there was notable representation from consumers aged 50-64 (33.8%) and those aged 25-34 (23%). Respondents aged 65-74 accounted for 4.1% of the total (Figure 2). Substantial majority of survey participants (96%) possess a university degree. Additionally, 2.7% reported completion of a vocational school, while 1.4% indicated having completed high school (Figure 3).

Four demographic questions were related to the professional experience of respondents. Approximately half of the respondents are associated with the research sector (54.1%), with both the education and industry sectors represented by 12.2% of respondents each. 8.1% are affiliated with non-governmental organizations (NGOs), and 5.4% are in the consultation sector. Sectors related to production and trade are represented by 4.1% and 2.7% of respondents, respectively. Only 1.4% of respondents work in other sectors (Figure 4). Most of the respondents' companies are categorized as large, employing over 201 employees, constituting 62.2% of the sample. Around 16.2% of companies have fewer than 10 employees, while 12.2% have between 10 and 49 workers. Medium-sized companies, ranging from 50 to 100 employees and 100 to 200 employees, were represented by 6.8% and 2.7% of respondents, respectively (Figure 5). Close to 60% of survey respondents occupy positions as experts or researchers. Directors or presidents, along with managers, account for 14.9% of respondents each. Engineers represent 5.4% of the sample, while office workers constitute 4.1%. Only 1.6% of respondents have roles other than those mentioned above within their companies (Figure 6). Respondents exhibit a range of experience levels in their respective sectors. Roughly one-third of participants boast between 11 and 20 years of experience. Around 20% of respondents possess 2-5 years of experience, while nearly 19% have accrued 21-30 years of industry expertise. Another 13.5% of respondents report being associated with their sectors for 6-10 years. 8.1% of participants have extensive experience exceeding 30 years, whereas only 5.4% have less than 1 year of sector-specific experience (Figure 7).

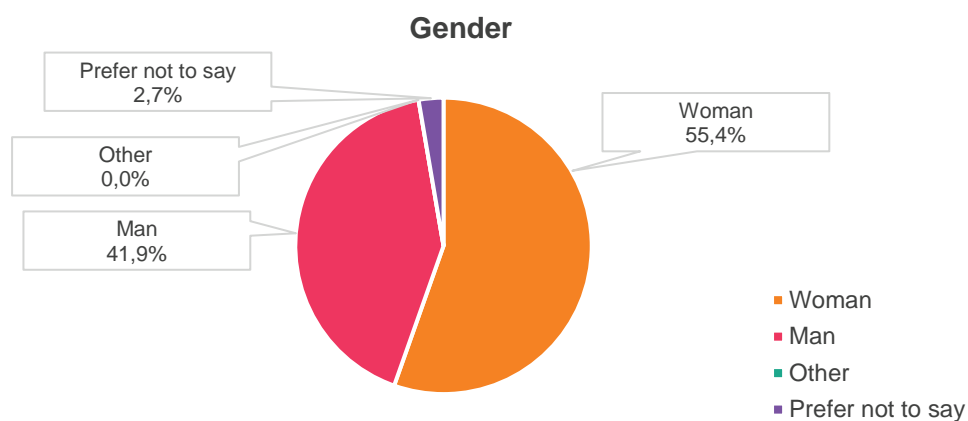


Figure 1. Gender of respondents.

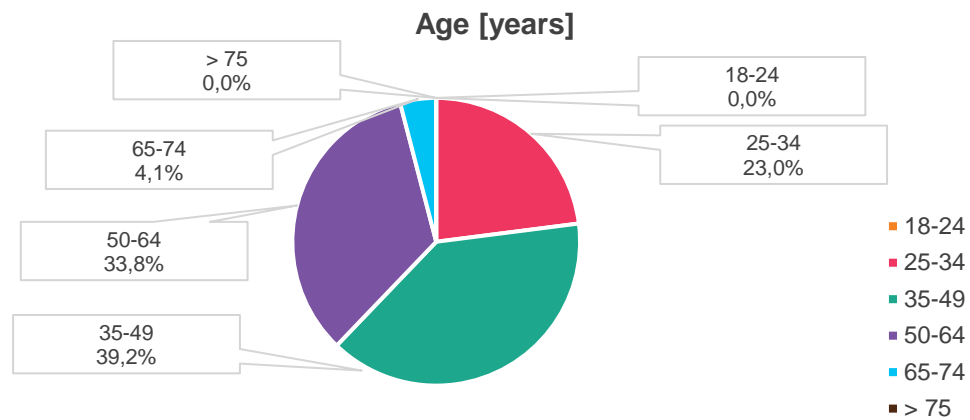


Figure 2. Age of respondents.

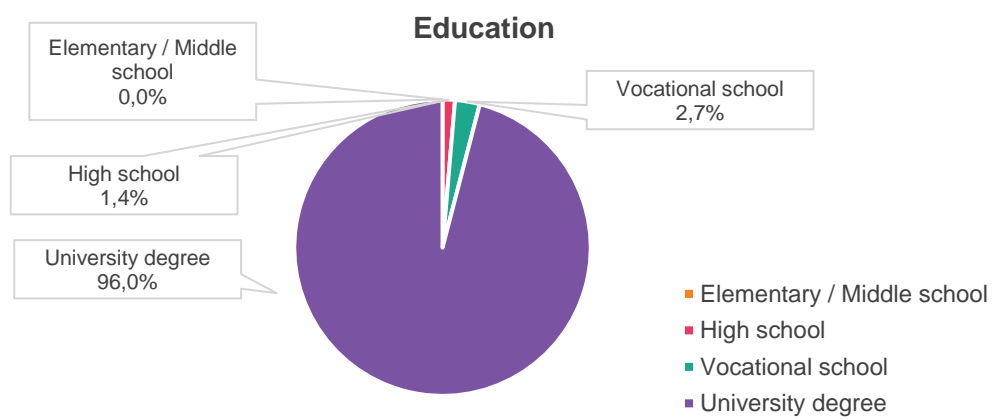


Figure 3. Education level of respondents.

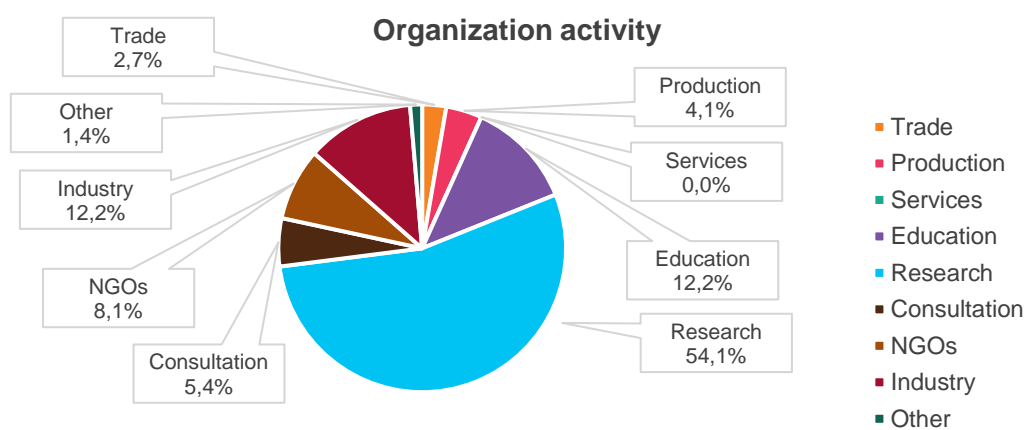


Figure 4. Organisation activity of respondents' workplace.

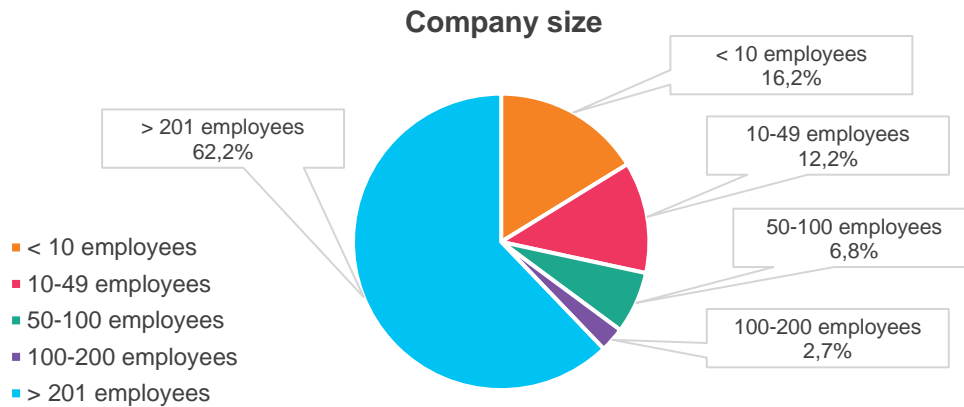


Figure 5. Respondents' company size.

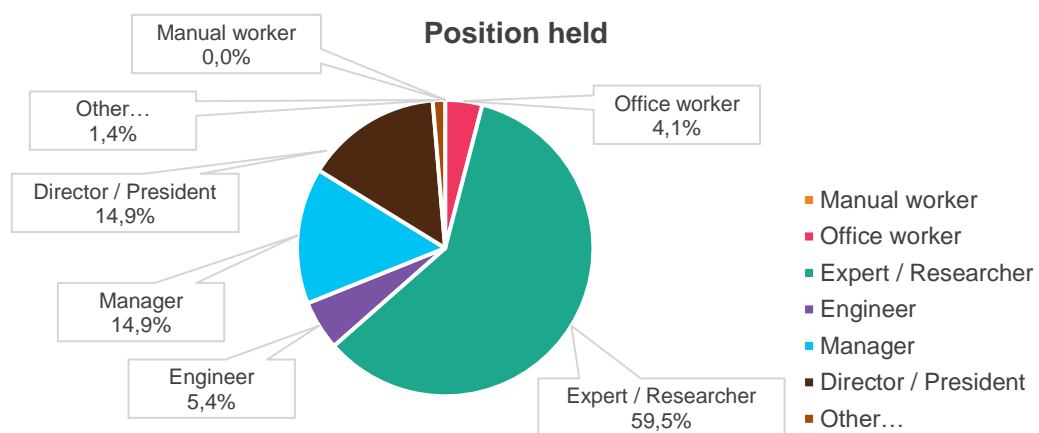


Figure 6. Position held by respondents.

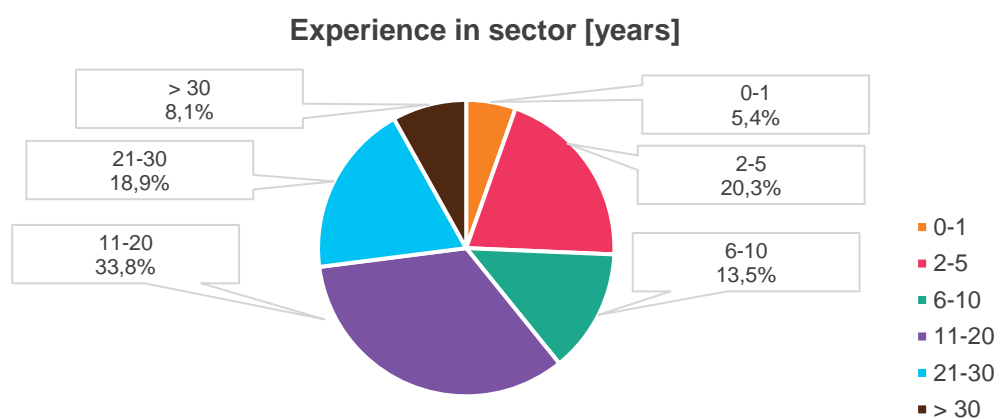


Figure 7. Respondents' experience in sector.

3.2. STAKEHOLDER MATRIX

A stakeholder matrix serves as a visual representation of stakeholder analysis, offering a strategic approach to leveraging relationships to achieve project objectives. It aids in identifying key individuals who can influence the project's success and in devising a communication and outreach plan. Building a stakeholder map enables:

- *Categorization of stakeholders and understanding their needs:* Identify and list all potential stakeholders, including internal and external parties such as team members, clients, suppliers, regulatory bodies, and end-users. Group stakeholders based on their interest, influence, and impact on the project, facilitating prioritization of efforts and resources. Conduct stakeholder analysis to comprehend their expectations, concerns, and goals. Prioritize stakeholders based on their influence and interest, distinguishing between primary stakeholders (high influence, high importance) and secondary stakeholders (lower influence or importance).
- *Determining the best communication methods:* Tailor communication strategies based on stakeholder preferences and needs. Utilize various channels such as meetings, reports, emails, or collaborative tools to ensure effective communication.
- *Allocating time and effort more efficiently:* Prioritize stakeholders who have a significant impact on the project's success or those with high influence. Regularly assess and adjust engagement strategies based on the evolving needs of different stakeholders.
- *Obtaining valuable insights:* Foster open and transparent communication to encourage stakeholders to share their insights and concerns. Actively seek feedback and use it to refine project strategies, ensuring continuous improvement.
- *Mitigating risks:* Engage key stakeholders early in the project to identify potential risks and concerns. Regularly update stakeholders on project progress and involve them in risk mitigation strategies.

The stakeholder matrix was developed based on the findings of the "Analysis of Stakeholders in the Soil Improvers Sector" survey. In stakeholder analysis, two variables have a significant impact on the project: "importance and significance" versus "influence/actual interest."

- Significance/importance refers to the stakeholder's ability to halt or modify the project. For instance, a government regulatory approval authority typically wields substantial power.
- Influence/interest represents the degree of alignment between the stakeholder's goals and those of the project. For example, a farmer who is the primary user of soil improvers analysed in the project would have a very high level of interest.

These pivotal variables are plotted on a chart, with the x-axis representing influence/interest and the y-axis representing significance/importance (Figure 8).

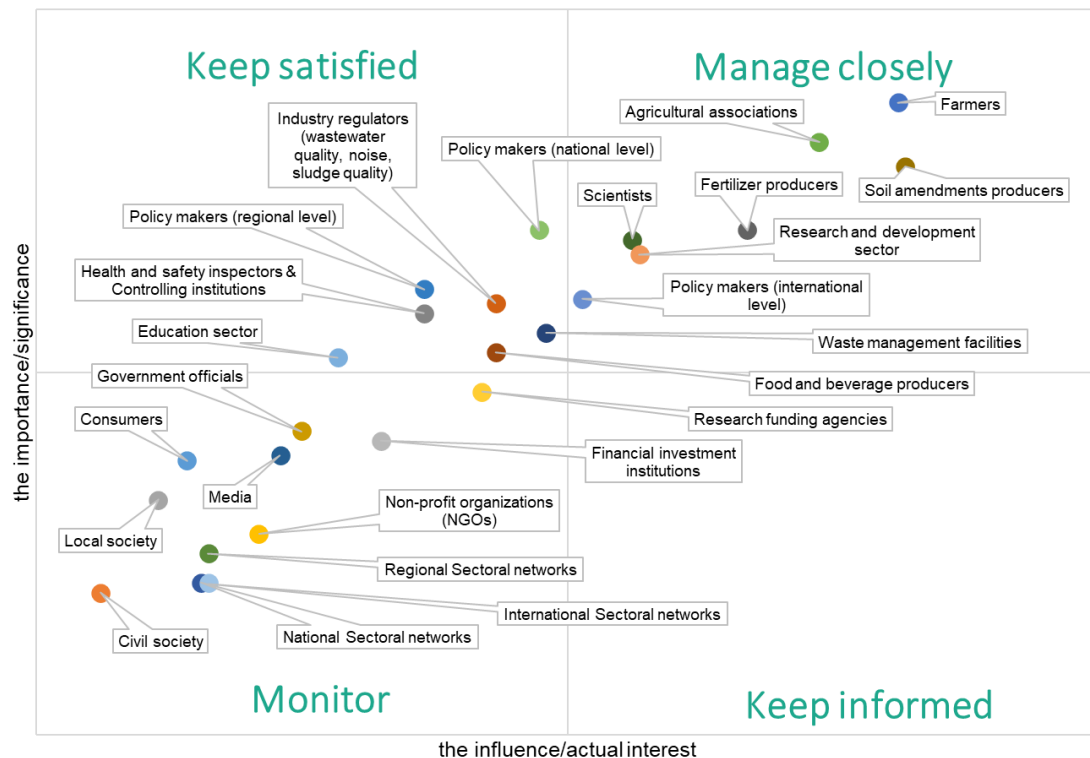


Figure 8. Stakeholder matrix.

First Group: Keep Satisfied (high importance/significance but low influence/interest)

This group comprises stakeholders who hold significant importance to the success of the soil improvers sector project but exhibit low interest in its activities (Table 1). They include policymakers at both national and regional levels, industry regulators overseeing aspects such as wastewater quality, noise, and sludge quality, waste management facilities, food and beverage producers, health and safety inspectors, controlling institutions, and the education sector. Policymakers at the national level are instrumental in shaping legislative frameworks and allocating resources for the development and implementation of sustainable practices in the soil improvers sector. Similarly, regulators play a crucial role in ensuring compliance with environmental standards and guidelines, thereby contributing to the sector's sustainability and safety. Waste management facilities are key players in managing organic waste streams, which are essential inputs for soil improvers production. Food and beverage producers are important stakeholders as their residue streams serve as feedstock for soil improvers. Ensuring their satisfaction and cooperation is vital for securing a consistent supply of organic materials. Health and safety inspectors and controlling institutions contribute to the overall quality and safety standards of soil improvers, enhancing consumer confidence and regulatory compliance. Lastly, the education sector plays a role in fostering awareness and knowledge dissemination regarding sustainable soil management practices, thereby indirectly supporting the goals of the project. Effectively managing the needs and expectations of these stakeholders, despite their relatively low interest in the project's activities, is critical to ensuring their continued support and contribution to the soil improvers sector's success.

Table 1. Main groups of stakeholders according to the stakeholder analysis.

Keep satisfied (high importance but low interest)	Manage closely (high importance and high interest)
Policy makers (national level)	Farmers
Industry regulators (wastewater quality, noise, sludge quality)	Soil amendments producers
Policy makers (regional level)	Agriculture associations
Waste management facilities	Fertiliser producers
Food and beverage producers	Scientists
Health and safety inspectors & controlling institutions	Research and development sector
Education sector	Policy makers (international level)
Monitor (low importance and low interest)	Keep Informed (low importance but high interest)
Research funding agencies	
Financial investment institutions	
Government officials	
Media	
Consumers	
Local society	
Non-profit organisations (NGOs)	
Regional Sectoral networks	
International Sectoral network	
National Sectoral network	
Civil society	

Second Group: Manage Closely (high importance/significance and high influence/interest)

This group consists of stakeholders who hold both high importance and high interest in the soil improvers sector project (Table 1). They include farmers, soil amendments producers, agriculture associations, fertilizer producers, scientists, the research and development sector, and policymakers at the international level. Farmers are pivotal stakeholders as end-users of soil improvers, directly impacting their effectiveness in enhancing soil health and productivity. Close management of farmers involves understanding their specific needs and preferences, providing tailored solutions, and fostering adoption through education and outreach programs. Soil amendments producers and fertilizer producers are directly involved in the manufacturing and distribution of soil improvement products. Close management of these stakeholders entails ensuring the quality, availability, and affordability of soil improvers, as well as fostering innovation to meet evolving agricultural needs. Agriculture associations represent the interests of farmers and agricultural businesses, advocating for policies and practices that support sustainable soil management. Close collaboration with these associations is crucial for aligning project objectives with industry priorities and garnering support from the agricultural

community. Scientists and the research and development sector contribute to innovation and knowledge generation in soil science, leading to the development of advanced soil improvement technologies and practices. Managing these stakeholders involves fostering collaboration, sharing insights, and leveraging research findings to drive continuous improvement in the soil improvers sector. Policymakers at the international level play a key role in shaping global policies and agreements related to soil health, environmental sustainability, and circular economy principles. Close engagement with these stakeholders is essential for advocating for supportive policies, securing funding opportunities, and promoting international cooperation in advancing soil improvers technologies and practices. Effective management of this group requires proactive communication, collaboration, and alignment of interests to maximize their collective contribution to the success of the soil improvers sector project.

Third Group: Monitor (low importance/significance and low influence/interest)

This group comprises stakeholders who have relatively low importance and low interest in the soil improvers sector project (Table 1). While their direct involvement may be limited, monitoring these stakeholders is essential to anticipate any potential changes in their influence or interest over time. They include research funding agencies, financial investment institutions, government officials, media, consumers, local society, non-profit organizations (NGOs), regional sectoral networks, international sectoral network, national sectoral network, and civil society. Research funding agencies and financial investment institutions, although they may not have a direct stake in the project, could influence the availability of resources and funding opportunities for future initiatives related to soil health and sustainable agriculture. Monitoring their activities and priorities allows project stakeholders to identify potential funding streams or partnership opportunities that align with project objectives. Government officials at various levels may have limited interest in the project due to competing priorities or lack of awareness about its significance. However, their decisions and policies could indirectly impact the soil improvers sector. Monitoring their activities and policy initiatives enables project stakeholders to identify potential synergies or areas for advocacy to align government actions with project goals. The media, consumers, local society, non-profit organizations, and sectoral networks may have minimal direct interest in the project but could play a role in shaping public perceptions, demand for sustainable products, or advocacy efforts related to soil health and environmental sustainability. Monitoring their engagement and activities helps project stakeholders identify emerging trends, concerns, or opportunities for outreach and communication. Civil society, including grassroots organizations and community groups, may have limited influence on the project's outcomes but could raise awareness or advocate for local initiatives that support soil health and sustainable agriculture. Monitoring their activities allows project stakeholders to identify potential allies or opportunities for community engagement and collaboration. While these stakeholders may have low immediate importance or interest in the project, ongoing monitoring ensures that project stakeholders remain responsive to evolving dynamics and can adapt their strategies to effectively engage or address emerging concerns as needed.

Fourth Group: Keep Informed (low importance/significance but high influence/interest)

Interestingly, there are no stakeholders identified in the survey results for this group, suggesting that there are no stakeholders who fall into the category of low importance but high interest in the soil improvers sector project (Table 1). However, hypothetically speaking,

stakeholders in this category could include individuals or organizations who may not have a direct impact on the project's outcomes but demonstrate a keen interest in its activities or outcomes. While their influence may be limited, keeping stakeholders in this group informed about the project's progress, findings, and achievements could help maintain goodwill, foster positive relationships, and potentially garner support or advocacy for the project's objectives. Examples of stakeholders who might fall into this category could include environmental activists, academic researchers with a tangential interest in soil health, or community groups focused on sustainability. Although no specific stakeholders have been identified for this group in the survey results, acknowledging and proactively engaging with stakeholders who demonstrate a high interest in the project despite their relatively low importance can contribute to building a supportive ecosystem for the soil improvers sector project.

4. KEY STAKEHOLDERS

The results of the stakeholder analysis allowed for determination of the list of key stakeholders in DeliSoil project. The list follows the Quadruple Helix Model. The Quadruple Helix Model serves as a conceptual framework for understanding innovation ecosystems, emphasizing the interconnectedness and collaboration among four key stakeholders: science, policy, industry and producers, and civil society. In the context of the DeliSoil project, this model provides a comprehensive lens through which to analyse and engage with stakeholders across multiple sectors and domains.

- *Science*: Scientists and research institutions play a central role in generating knowledge, conducting research, and developing innovative solutions to address challenges in soil health and sustainable agriculture. Their expertise and contributions drive technological advancements, inform evidence-based decision-making, and shape the trajectory of the DeliSoil project through their research findings and insights.
- *Policy*: Agriculture associations and policymakers at international, national, and regional levels shape the regulatory and policy landscape governing soil management, fertilizers, and food safety. Their decisions and initiatives have profound implications for the implementation and scaling of sustainable soil improvement practices advocated by the DeliSoil project. Engaging with policymakers ensures alignment with regulatory requirements, secures funding support, and fosters an enabling policy environment conducive to project success.
- *Industry and Producers*: Soil amendments producers, fertilizer producers, waste management facilities, food and beverage producers, farmers, and horticulturists form the backbone of the soil improvers sector, contributing to the production, distribution, and application of sustainable soil improvement products. Their involvement is essential for driving innovation, scaling up production, ensuring market acceptance, and promoting adoption of soil health practices advocated by the DeliSoil project. Collaboration with agricultural advisors and European Innovation Partnership (EIP) groups facilitates knowledge transfer, technology diffusion, and stakeholder engagement within the agricultural community.
- *Civil Society*: Local communities, citizens, and consumers represent the end-users and beneficiaries of soil improvement practices promoted by the DeliSoil project. Their awareness, acceptance, and demand for sustainable products and practices influence market dynamics, consumer behaviour, and societal norms related to soil health and environmental sustainability. Engaging with civil society stakeholders fosters public support, builds trust, and enhances the project's social license to operate, ultimately contributing to its long-term viability and impact.

While the survey may have identified certain stakeholders as having low importance or interest, it's essential to recognize that stakeholders like consumers or civil society still play a crucial role in the project ecosystem. Their inclusion as key stakeholders ensures that the project remains responsive to societal needs, values, and aspirations, enhancing its relevance, legitimacy, and impact. Moreover, engaging with diverse stakeholders fosters collaboration, builds trust, and promotes inclusivity, ultimately strengthening the project's resilience and sustainability in the face of evolving challenges and opportunities. By adopting a holistic approach that embraces the Quadruple Helix Model and prioritizes stakeholder engagement, the DeliSoil project can leverage the collective wisdom, resources, and

commitment of key stakeholders to achieve its objectives and contribute to the transition towards a more sustainable and resilient soil improvers sector in Europe.

The full list of key stakeholders in DeliSoil project:

1. Science
 - a. Scientists
 - b. Research and development sector
 - c. Mission Soil projects
2. Policy
 - a. Agriculture associations
 - b. Policy makers (international, national, and regional level) - e.g. developers of the food safety legislation and authorities monitoring regulations regarding the development and the use of fertilisers or soil improvements
3. Industry and producers
 - a. Soil amendments producers
 - b. Fertiliser producers
 - c. Waste management facilities
 - d. Food and beverage producers
 - e. Farmers
 - f. Horticulturists
 - g. Agricultural advisors
 - h. EIP groups
4. Civil society:
 - a. Local communities and citizens
 - b. Consumers

5. STAKEHOLDER DESCRIPTION

Science

The first group of stakeholders in the DeliSoil project comprises entities within the scientific community, encompassing a diverse range of experts and research institutions dedicated to advancing knowledge and innovation in soil health and sustainable agriculture. Scientists within this group play a pivotal role in conducting groundbreaking research, pioneering new methodologies, and providing evidence-based insights that drive progress in the field. The research and development sector represents organizations and institutes committed to advancing soil improvement technologies, practices, and products. Entities such as the Italian National Agency for New Technologies, Energy and Sustainable Economic Development, Interuniversity National Consortium for Environmental Sciences, Research Institute of Organic Agriculture exemplify this sector's involvement, conducting cutting-edge research on soil management strategies and collaborating with industry partners to develop innovative soil improvement solutions. Additionally, Mission Soil projects funded by initiatives like Horizon Europe play a vital role in fostering collaboration and knowledge exchange among researchers and stakeholders across Europe. Projects such as Waste4Soil, ECHO, BIN2BEAN or FENIX, bring together multidisciplinary teams to address key challenges in soil conservation and sustainable land management. Together, these scientific stakeholders form the cornerstone of the DeliSoil initiative, driving innovation, informing policy decisions, and catalysing positive change in the soil improvers sector.

Policy

The second group of stakeholders crucial to the success of the DeliSoil project revolves around policy development and implementation, shaping the regulatory landscape and providing guidance for sustainable soil management practices. Agriculture associations represent a key component of this group, advocating for the interests of farmers and agricultural stakeholders at local, national, and international levels. Examples of agriculture associations in the European Union include Copa-Cogeca, which represents the interests of European farmers and cooperatives, and the European Landowners' Organization (ELO), which works to promote sustainable land management practices across the EU. Additionally, policymakers at international, national, and regional levels play a pivotal role in formulating and enforcing policies related to soil health, agricultural practices, and environmental protection. These policymakers develop legislation, regulations, and standards governing aspects such as food safety, fertilizer use, and soil improvement techniques. For instance, authorities like the European Commission for Agriculture and Rural Development influence EU-wide policies on agriculture and rural development, while national agencies like Germany's Federal Ministry of Food and Agriculture oversee regulations regarding the use of fertilizers and soil improvements within their respective jurisdictions. By engaging with agriculture associations and policymakers across different levels, the DeliSoil project can ensure alignment with regulatory requirements.

Industry and production

The third group of stakeholders critical to the DeliSoil project encompasses a diverse array of industry and producers involved in the soil improvement sector, as well as key actors within the agricultural community. Soil amendments producers represent a vital component of this

group, manufacturing and distributing products designed to enhance soil health and fertility. Examples of soil amendments producers in the European Union include Biolan Oy in Finland, which specializes in organic soil conditioners, and Unimer S.p.A. in the Italy, known for its organic soil improvers. Fertilizer producers also play a significant role in the sector, manufacturing chemical or organic fertilizers used to supplement soil nutrients and promote plant growth. Companies like Yara International ASA in Norway and EuroChem Group AG in Switzerland are prominent examples of fertilizer producers operating within the EU. Waste management facilities represent another key stakeholder group, responsible for processing organic waste streams and producing compost or biogas as by-products for use in soil improvement applications. Additionally, food and beverage producers generate organic waste streams that can be repurposed as inputs for soil improvement products, fostering circular economy principles within the agricultural sector. Companies like Nestlé, Danone, and Unilever are among the leading food and beverage producers in the EU actively engaged in sustainable waste management initiatives. Farmers and horticulturists form the backbone of agricultural production systems, directly applying soil improvers to enhance soil fertility and crop yields. Agricultural advisors provide expertise and guidance to farmers on soil management practices, crop selection, and input use, facilitating the adoption of sustainable agricultural techniques. European Innovation Partnership (EIP) groups bring together stakeholders from across the agricultural sector to promote innovation, knowledge exchange, and collaboration in areas such as soil health and sustainable agriculture.

Civil society

The fourth group of stakeholders vital to the DeliSoil project encompasses civil society, representing local communities, citizens, and consumers who play a crucial role in shaping societal values, preferences, and behaviours related to soil health and sustainable agriculture. Local communities and citizens form the backbone of civil society engagement, representing diverse stakeholders residing in rural and urban areas across the European Union. These stakeholders include residents, community leaders, and grassroots organizations actively involved in environmental conservation, land stewardship, and sustainable development initiatives. Examples of local communities and citizens engaged in soil health initiatives may include residents of rural villages, urban gardeners, and community organizations advocating for green spaces and sustainable land use practices in various countries across Europe. Consumers represent another key component of civil society, driving market demand and influencing purchasing decisions for food products grown using sustainable soil management practices. European consumers increasingly prioritize environmental sustainability, ethical sourcing, and health considerations when making food choices, creating opportunities for producers and retailers to differentiate their products based on sustainable farming practices.

6. CONCLUSIONS

The stakeholder analysis conducted within the DeliSoil project underscores the critical role of stakeholder engagement in advancing sustainable soil management practices within the soil improvers sector. By using the Quadruple Helix Model, which includes science, policy, industry and producers, and civil society, the project identifies key stakeholders and highlights their complexity in driving innovation, shaping policies, and fostering societal change.

The analysis identifies four distinct groups of stakeholders, each contributing unique perspectives, resources, and expertise to the DeliSoil project. Scientists and research institutions are pivotal in generating knowledge, conducting research, and developing innovative solutions to address soil health challenges. Collaborating with Mission Soil projects and research organizations ensures access to cutting-edge research and technology, driving progress in sustainable soil management. Agriculture associations and policymakers at various levels play a crucial role in shaping regulatory frameworks and policies governing soil management practices. Engaging with these stakeholders ensures alignment with regulatory requirements, secures funding support, and fosters an enabling policy environment conducive to project success. Soil amendments producers, fertilizer producers, waste management facilities, food and beverage producers, farmers, and agricultural advisors form the backbone of the soil improvers sector. Collaboration with these stakeholders is essential for driving innovation, scaling up production, and promoting adoption of sustainable soil improvement practices advocated by the DeliSoil project. Local communities, citizens, and consumers represent the end-users and beneficiaries of soil improvement practices. Their awareness, acceptance, and demand for sustainable products influence market dynamics and societal norms. Engaging with civil society stakeholders fosters public support, builds trust, and enhances the project's social license to operate. While certain stakeholders may have been identified as having low immediate importance or interest, their inclusion as key stakeholders ensure responsiveness to societal needs and values. Engaging with diverse stakeholders fosters collaboration, builds trust, and promotes inclusivity, ultimately strengthening the project's resilience and sustainability.

The DeliSoil project should continue to prioritize stakeholder engagement and collaboration across the Quadruple Helix Model. This includes ongoing communication, knowledge sharing, and capacity building to ensure alignment with stakeholder needs and aspirations. By adopting a holistic approach that embraces stakeholder diversity and inclusivity, the project can leverage the collective wisdom, resources, and commitment of key stakeholders to achieve its objectives and contribute to a more sustainable and resilient soil improvers sector in Europe.

7. REFERENCES

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Stakeholder matrix and description



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8. ANNEX 1



Analysis of Stakeholders in the Soil Improvers Sector

Dear Respondent,

This questionnaire is dedicated to identifying key stakeholders in the **EU soil improvers sector** in the context of a circular bioeconomy approach to the waste hierarchy, and the creation of sustainable soil improvers in support of soil health in Europe.

Soil improvers are defined as a material added to soil in situ, whose main function is to maintain or improve its physical and/or chemical and/or biological properties (except for liming materials). A tailored soil improver is a material obtained from a food processing residue stream which has been identified and tested for adding to soil. This also includes organic fertilisers. Applying circular bioeconomy methods to the food industry value chain, improving the use of residue streams and regional production of soil improvers will enhance food system sustainability and so reduce waste.

A **stakeholder** is a person, group, or organization with a vested interest, or stake, in the decision-making and activities of a project and is interested in the project's outcome or execution. Stakeholders are typically the members of a project team, project managers, executives, project sponsors, customers, and the end-users. Stakeholders are people who will be affected by your project at any point in its life cycle, and their input can directly or indirectly impact the outcome. Stakeholders can have a direct or indirect influence on the activities or projects of an organization. Their support is often required for project success.

The questionnaire is a part of the international project *Delivering Soil improvers through improved recycling and processing solutions for food industry residues streams (DeliSoil)*, funded by the European Union under the Horizon Europe Program, Grant Agreement No. 101112855 (DeliSoil).

There are no personal data collected.

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I PART. Stakeholders' importance and influence analysis

Q1. Using a scale from 0 to 4, where 0 represents "not at all important" and 4 represents "very important," please assess the importance/significance of the following stakeholders for the soil improvers sector. (give '+')

Stakeholder	Not at all important (0)	Low importance (1)	Neutral (2)	Important (3)	Very Important (4)	No opinion
Consumers						
Civil society						
Local society						
Non-profit organizations (NGOs)						
Farmers						
Agricultural associations						
Media						
Food and beverage producers						
Fertiliser producers						
Soil amendments producers						
Waste management facilities						
Scientists						
Education sector						
Research and development sector						
Financial investment institutions						
Research funding agencies						
Policy makers (international level)						
Policy makers (national level)						
Policy makers (regional level)						

Industry regulators (wastewater quality, noise, sludge quality)						
Health and safety inspectors & Controlling institutions						
Government officials						
National Sectoral networks						
Regional Sectoral networks						
International Sectoral networks						
Middleman (who,)						
Other.....						

Q2. Using a scale from 0 to 4, where 0 represents "no influence" and 4 represents "very high influence," please evaluate the influence/actual interest of the following stakeholders for the soil improvers sector. (give '+')

Stakeholder	No influence (0)	Low influence (1)	Neutral (3)	High influence (4)	Very high influence (5)	No opinion
Consumers						
Civil society						
Local society						
Non-profit organizations (NGOs)						
Farmers						
Agricultural associations						
Media						
Food and beverage producers						
Fertiliser producers						
Soil amendments producers						
Waste management facilities						
Scientists						
Education sector						
Research and development sector						
Financial investment institutions						
Research funding agencies						
Policy makers (international level)						
Policy makers (national level)						
Policy makers (regional level)						
Industry regulators (wastewater quality, noise, sludge quality)						

Health and safety inspectors & Controlling institutions						
Government officials						
National Sectoral networks						
Regional Sectoral networks						
International Sectoral networks						
Middleman (who,)						
Other.....						

I PART. Respondent information

Q3 Your organization activity

- ☐ trade ☐ production ☐ services ☐ education ☐ research ☐ consultation ☐ NGOs
☐ industry ☐ other (please fill in)

- Q4** ☐ < 10 employees ☐ 10-49 employees ☐ 50-100 employees ☐ 101-200 employees
☐ > 201 employees

Q5 Age

- ☐ 18-24 ☐ 25-34 ☐ 35-49 ☐ 50-64 ☐ 65-74 ☐ >75

Q6 Gender

- ☐ Woman ☐ Man ☐ Other ☐ Prefer not to say

Q7 Education

- ☐ Elementary/Middle school ☐ High school ☐ Vocational school ☐ University degree

Q8 Your position held

- ☐ manual worker ☐ office worker ☐ expert/researcher ☐ engineer ☐ manager ☐ director / president

Q9 Experience in water/ wastewater sector (years)

- ☐ 0-1 ☐ 2-5 ☐ 6-10 ☐ 11-20 ☐ 21-30 ☐ >30