



DIGITISATION: ECONOMIC AND SOCIAL IMPACTS IN RURAL AREAS

POLICY BRIEFS

FEBRUARY 2022

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DESIRA receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 818194.

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Project name	DESIRA Digitisation: Economic and Social Impacts in Rural Areas
Project ID	818194
H2020 Type of funding scheme	Research and Innovation Action (RIA)
H2020 Call ID & Topic	H2020-RUR-2018-2 / RUR-02-2018 Socio-economic impacts of digitisation of agriculture and rural areas
Website	www.desira2020.eu
Document Type	Deliverable
File Name	Policy Briefs
Status	Final
Authors	Sylvain Quiédeville, Olivier Ejderyan, and all partners
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1. Introduction

DESIRA (Digitisation: Economic and Social Impacts in Rural Areas) is a Horizon 2020 project (2019-2023) coordinated by the University of Pisa. It involves 25 partner organisations (research institutes, NGOs and SMEs) in a multi-actor and inter-disciplinary Consortium.

The project aims to improve the capacity of society and political bodies to respond to the challenges that digitalisation generates in agriculture, forestry and rural areas.

This Deliverable D3.2 “Policy Briefs” is part of the Task 3.2 “Living Lab Scenario” taking place in the frame of WP3 in the DESIRA project. Stakeholder workshops were conducted in each Living Lab (LL) in which possible future scenarios were developed in relation to the LL topic and expected future state of digitalisation. The future period targeted was the year 2031, corresponding to a time span of approximately 10 years from the time the workshops were conducted. Diverse scenarios were elaborated in each LL, including two main ones corresponding to the most plausible situations.

Each LL was responsible to produce a Policy Brief both in English and in national language (when the latter was not in English). The 4 pages Policy Briefs are constructed as follows:

- A first section introduces the LL and the context in which it develops. Particular attention is paid to the agricultural, forestry or rural areas depending on the focus of the LL.
- A second part presents the scenario question addressed with stakeholders. It also describes the methodology in relation to the scenario development exercise.
- A third section presents the most relevant scenarios developed among stakeholders. It presents the narratives associated to the scenarios, including a description of the associated opportunities and challenges.
- A fourth section depicts the relevant policy related discussions that occurred among stakeholders during workshops.
- A fifth section makes a listing of the policy options identified as desirable for supporting enhanced transition pathways.

In this Deliverable, the Policy Briefs are compiled altogether and are exposed in the next section. This corresponds to 21 Policy briefs produced in English and 19 Policy Briefs translated into the corresponding national language of the LL.

2. Living Lab Policy Brief

Each Living Lab (LL) was responsible to produce a Policy Brief both in English and national language. In this Deliverable, these Policy Briefs are compiled altogether. The English versions are exposed in the first sub-section. The translated versions are accessible in the second sub-section.

2.1. English version

21 Policy Briefs were produced in English, corresponding to 1 Policy Brief produced in each Living Lab (LL). These Policy Briefs were compiled altogether in this Deliverable and can be consulted in this sub-section. The 21 LLs that correspond to each of the Policy Briefs are the following ones:

- LL.1. Oosterwold (NL): Local markets.
- LL.2. Central Ostrobothnia (FI): Circular economy.
- LL.3. Rhineland-Palatinate (DE): Communication and gender.
- LL.4. Rural Poland (PL): Participation.
- LL.5. Latvia (LV): Digital marketing.
- LL.6. Lake Constance (DE): Organic fruit production.
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- LL.21 Ireland (IE): Rural community.

Towards Urban Agriculture in 2030

This policy brief suggests policy options in relation to the realisation of urban agriculture and local food production in the Living Lab of Oosterwold in the Netherlands. The two scenarios discussed with residents, focused on Oosterwold in 2030 with (1) an open landscape and self-organisation, where governmental interference is limited - Oversupply of locally produced food are sold through short supply chains to Almere city region by means of digital technologies; and (2) a scenario with a closed landscape and stricter governmental regulation, which is characterised by an urban atmosphere with high-rise buildings combined with urban agriculture. In this scenario, community-building around (urban) agriculture is fragmented, while in the first scenario community-building pivots around the short food supply chain. The policy options in both scenarios gravitates towards means to support community-building through urban agriculture, like hiring green community intermediaries, starting a central digital hub, and constructing a food community building.

CONTEXT

The Living Lab (LL) of Oosterwold is located in the Netherlands, which is one of the leading countries in terms of digitalisation. Oosterwold (Figure 1) is a watershed in Dutch (peri-)urban planning. This new peri-urban area of the city of Almere integrates rather than segregates urbanisation and (urban) farming. Moreover, the area is aimed to produce 10% of Almere food basket. In Oosterwold, like in most areas of the Netherlands, there is high-speed internet access. Moreover, the community of Oosterwold makes use of social media platforms and apps, like Facebook, Instagram etc. These preconditions are helpful for the community since the residents of Oosterwold rely on self-organisation and are obliged to farm 50% of their plots. Because the majority of the community has no background in (urban) farming, there is a risk of suboptimal usage of their plots for food production. Digitalisation can help to facilitate the exchange of knowledge and is considered helpful to establish a community in local food production and distribution.

Even though the community faces different future visions of how to evolve urban agriculture in the area as well as the lack of an appealing focal route to achieve these

future visions, there are already some initiatives and projects that help to bring the community together and exchange knowledge regarding urban agriculture. A recent example is the food cooperation Oosterwold (www.coopoosterwold.nl). The cooperation, with financial support of the Municipality of Almere, develops an app for practical information on cultivation, coordination, and distribution of food production in Oosterwold. Moreover, the local councillors are currently discussing possibilities for the construction of a communal centre, where local vegetables and fruits can be stored and processed.



Figure 1. The new peri-urban Oosterwold of the city of Almere (NL).
Source: Municipality of Almere.

RESEARCH APPROACH

Two interactive workshops were conducted using a future scenario method which stimulates creative thinking regarding urban agriculture and discuss its future possibilities. The workshops revolved around the question: What does the urban farming community of Oosterwold look like in 2030? The scenario-axis method was used, resulting in four possible scenarios of how the future can unfold. The participants were asked to select two of these scenarios to further explore in the first workshop. The second workshop focussed on transition pathways from the current situation towards the (preferred) future vision. The following three main topics stood central to the first workshop: 1. urban agriculture, 2. community building and, 3. the role of digital technology in supporting urban agriculture and community building. Subsequently, the second workshop focussed at so-called back casting, i.e. extracting (today's) actions to achieve preferred future developments. In the second workshop different fictional headlines of newspapers related to the two scenarios were presented to the participants. The local newspaper headlines were shown to give participants an idea of the possible transition pathways towards the two scenarios of Oosterwold in 2030. These possible transition pathways were the starting point of a debate which was funnelled towards an action agenda.

SCENARIOS DEVELOPED

The scenario building (workshop 1) started with exploring the two axes of possible future development of Oosterwold: 1) self-organisation vs strict regulation by authorities and 2) open landscape vs closed (urbanised) landscape. The two selected scenarios by the participants of the workshop are called (1) Room for everyone (Figure 2) and (2) Manhattan with rules (Figure 3). In the first scenario, Oosterwold builds around an open landscape with self-organisation. In this scenario governmental interference is limited. Surpluses of locally produced food are sold through (self-organised) short supply chains to Almere city region.

To support food production in Oosterwold, digital technologies give the opportunity for interaction between food suppliers (residents) and to locally coordinate supply and demand. This scenario is more-or-less a continuation of current development in Oosterwold.



Figure 2. Scenario "Room for everyone".
Source: (Jam Visual Thinking, NL).



Figure 3. Scenario "Manhattan with rules".
Source: (Jam Visual Thinking, NL).

In the second scenario Oosterwold is defined by a closed landscape (much higher density of houses) with stricter governmental regulation. It thus opposes the first scenario. The scenario is characterised by an urban atmosphere with high-rise buildings combined with (large plots of professional) urban agriculture. In this scenario it is a challenge not to avoid the national housing crisis i.e., land prices increase resulting in smaller plots to farm. Many new residents have outsourced food production to professionals or even abandoned it, nevertheless, still 50% of the land is used for (professional) food production. Community building around agriculture thus is fragmented. Digital technology is used by the professionals for precision farming as well as to coordinate

the food production process and share knowledge. Digital technology is also applied to connect the farmers and the residents of the area. The local authorities strictly coordinate and control the 50% rule; however, the self-organising nature of the area is abandoned.



ALTHOUGH THE LIVING LAB OF OOSTERWOLD IS KNOWN TO BE SELF-ORGANISED, OVERARCHING SUPPORT BY THE MUNICIPALITY WOULD HELP TO BRING NEW INITIATIVES TO LIVE.

The second workshop focussed at back casting from the two scenarios with the goal to compile an action agenda to achieve preferred future developments. This action agenda pivots around how Oosterwold residents as well as local authorities can support the development of (communities in) urban agriculture in Oosterwold in 2030. The essential need is to build food communities around digital systems in an area that relies on self-organisation (public investment comes secondarily). However, the different food initiatives in Oosterwold are still developing, and so are their (future needs for) digital means.

POLICY RELATED DISCUSSION

Participants appreciated the conversation about the future of Oosterwold. Afterwards the conversation went on about how they can continue this way of thinking around the future for community building, urban agriculture, and digital platforms for exchanges.

Ideas were gathered regarding future initiatives/policies to facilitate 50% urban agriculture and who should be responsible for these initiatives. One of the ideas is the implementation of intermediary actors such as green community intermediaries. Such actors can actively share knowledge with residents on how to produce food, build food communities and can connect residents with similar demands or intentions in terms of urban agriculture. This could speed up the process of embedding the urban agriculture

performance in Oosterwold efficiently. Moreover, the green community intermediary could also give workshops, where community members meet and share solutions. This would concomitantly stimulate community building. However, the actors of the scenario workshop were not even sure how such an intermediary should be organised or funded.

The discussion at the end of the meeting made it clear that participants require support by the municipality or another overarching institution/actor whilst at the same time maintaining their self-organising practice. All the different ideas of initiatives that were discussed with the participants underlined the need of having a coordinating actor that brings things forward. When participants discussed on whom could fulfil the leading positions they mostly pointed towards the municipality or local volunteers. Since most residents in Oosterwold work outside of the community, it is hard to find people who have the time, authority, and resources to start and guide initiatives supporting urban agriculture at area level. Nevertheless, some organisations emerge within the community. Besides the food cooperation Oosterwold, there are the Cooperation Oosterwold, the VoKo (a consumer cooperative), and the Oogsterwold (a knowledge platform).

These overarching initiatives could also be involved in the establishment of a food community building, where residents can store, process and exchange vegetables and fruits. For this, Oosterwold community needs to invest in a common place to establish this communal location. It would need someone who is proficient in handling storage, processing, logistics and who understands the food market. Such a position is crucial and could be merged with that of the intermediary. However (again), the question is whom should (financially) support this position? Alternatively, volunteers could get together to take over this task.



This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

POLICY OPTIONS

Facilitate debate

- Discussions between residents and the municipality are needed and should be encouraged to develop mutual understanding of what can be expected from the residents as well as authorities in terms of urban agriculture and how to achieve this expectation.
- Conducting workshops and meetings, where community members meet and have to think of solutions together.

Augment expertise in urban agriculture

- An (online and interactive) guide or a manual for urban agriculture that supports new residents to plan and align their food production at different levels in their development in Oosterwold.
- Hire green community intermediaries. These intermediaries actively share knowledge with residents on how to produce food, and build food communities, as well as connecting residents with similar demands or intentions in terms of urban agriculture or to organise workshops or meetings.

Create a central digital hub

- The creation of a digital communal and interactive meeting point (website, platform and / or app) is supportive in gathering and sharing all kinds of information about urban farming, food production, food retailing and consumption.
- This platform should combine already existing sources of information with new information. The platform could also operate as food switchboard between Oosterwold and the greater community of Almere city region.

Establish a food community building

- A food community building is considered as a cornerstone in creating a local food community in Oosterwold.
- Authorities should actively invest in the construction of this community building.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalisation in the context of urban agriculture in Oosterwold.

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Bioeconomy and digitalisation in Finland

The scenario workshop of the Biovalley Finland Living Lab wanted to answer the following question: **What will the bioeconomy in Central Ostrobothnia be like in year 2031, given the progress of digitalisation, circular economy, energy transition and research, development, and innovation (RDI)?**

This policy brief focuses on two scenario narratives. Better scenario was built on the advancement of distance work. When more people combine near and distant work, they help reconnecting the rural and urban living worlds. Worse scenario was built on fast energy transition where inhabitants 'rush to adapt'.

In 2031 we should have a broad mix of sustainable energy sources (including photocatalysis) and a large menu of housing-working combinations. Rural areas should not invest only in automation that replaces human work. We should combine human creativity with the advantages that digital technologies offer.

CONTEXT

Finland is usually high in international comparisons that rank the level of digitalisation in the developed countries. Still there are differences in digitalisation between regions and inside regions. Rural-urban digital divide means that access to broadband and fast mobile networks is much better in urban areas where the supply comes from commercial operators. In rural areas there can be fast broadband connections where public subsidies have been used to build fibre networks.

In Central Ostrobothnia (CO) automated production lines and robots are used in the Kokkola Industrial Park (KIP). Also, bigger dairy farms use automated milking systems and manure robots that help scheduling work in family farms. Forest harvesters use public geographical data that connects forest owners with wood amounts in different areas.

Biovalley Finland (BF) is a "system of systems" which makes it difficult to understand. BF connects RDI actors, companies, SMEs, farms, regulators, and education institutes. All the parts of BF network (see Figure 1) are known before but only putting them in interaction starts the development processes. Sometimes BF

is the needed catalyst, but emergent systems also have characteristics that no stakeholder has on its own. Keeping things apart leads either to regional path dependency or to scientific silos. Combining different knowledge bases (analytical, synthetic, and symbolic) is advantageous even if in practise new ideas are found by pilot projects and experimenting. Random events or infrequent formal meeting are not enough. Trust and capacity to accept novelties develops slowly.

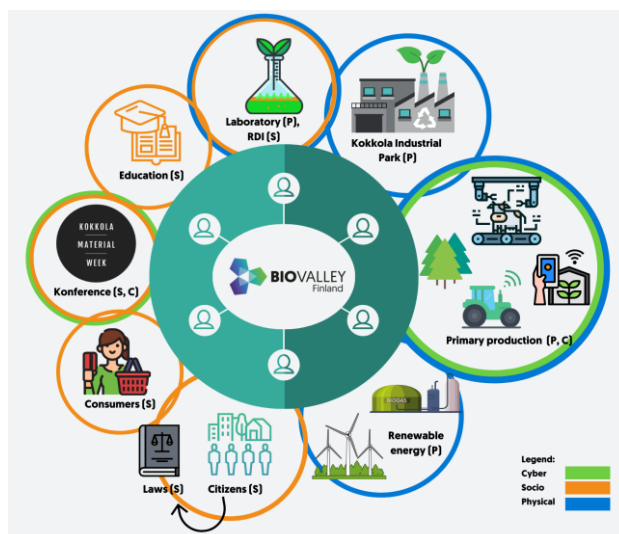


Figure 1. Social-cyber-physical (SCP) system of the Biovalley Finland consist of numerous functional and sectoral networks.

RESEARCH APPROACH

To develop resilient and successful bioeconomy in Central Ostrobothnia, there is a need to anticipate different pathways that can start from the present situation. By imagining what to do when different threats and opportunities unfold, we can identify what most urgent resources are needed.

The scenario question (SQ) is: ***What will the bioeconomy in Central Ostrobothnia be like in 2031, given the progress of digitalisation, circular economy, energy transition and research, development, and innovation (RDI).*** The SQ tells that these pressures are the ones where we must concentrate our development efforts.



THE LIVING LAB SCENARIOS WERE BASED ON FOUNDATIONAL ECONOMY - BASIC NEEDS (ENERGY, FOOD, HOUSING, EQUALITY, AND KNOWLEDGE) MUST BE SATISFIED IN ALL CIRCUMSTANCES.

The scenario workshop took place in face-to-face in October 2021. Having a live event was a gamble as some possible partners would not show up because of fears of COVID-19 pandemic. Doing group work and co-creating the future scenarios was still considered the most important task.

SCENARIOS DEVELOPED

The LL participants developed two main scenarios that had an intermediate character compared with business -as -usual (BAU) and extreme situations (utopia/dystopia).

A better but not best (BnB) scenario was built on the distance work. When people combine near and distant work, they can mix living in the rural area and working in the city. Mentally being part of rural and urban networks is good as it prevents living in silos in a shared society.

Digitalisation makes it possible for people to choose where they want to live. Energy is saved if people commute less, but overall, multi-locality living can create more emission of greenhouse gases.

Multifunctional agriculture is easier if a family can earn some income from crops and grass growing, something from forestry and something from distance work. Not all work has to be full time and all year round. Tourism can offer income from renting summer cottages, which can be advertised on some specialised platform.

A "worse not worst" (WnW) scenario was based on **energy transition**. Cold winter, high energy and electricity prices and almost ending of the traditional use of peat for energy purposes has created feelings of an energy crises. As the energy use of peat ceases, the supply of growth and bedding peat will also deteriorate. As time goes by, new bio-based product from forests and biogas production by-products will be developed to replace them.

The positive side is that, as the profitability of renewable energy technologies improves, local energy companies, businesses and households are adopting them at a rapid pace. This will also bring economic activity to less populated areas where major decentralised energy production projects are being carried out.

Landowners receive income by renting their forest land to wind farms, solar energy is collected from abandoned peat lands, which will produce fast-growing plants for biogas production.

Exploiting the region's extensive potential for wind power and the growth of mining create jobs for rural experts. Agricultural biomass is utilised in farm-specific or shared biogas plants on several farms. Cost-effective space size technological solutions enable the direct sale of biogas from farms to low-emission transport. Digital platforms enable the matching of demand and supply for energy, biomasses, and other raw materials.

POLICY RELATED DISCUSSION

The LL participants focused on understanding what the drivers of change meant for the region. The following policy options are thought to be relevant for all possible scenarios.

Usually, future scenario workshops focus on different technologies. We also listed photocatalysis, cellular meat, vertical farming, green and turquoise hydrogen production, battery materials for electrical cars et cetera. Our backward and forward timelines noticed many technologies but here we consider mostly changes in regional economy.

The thought processes of the LL can be crystallised to make a distinction between approaches that focus on energy transitions in, of and by regions.

If we conceptualise regions as agents of change through their political powers and administrative capabilities, we can learn how regional twin transition of green and digital technologies advances in Finnish multi-level governance system. The hindsight is that the lessons learned may be context-specific so that transregional and -national usability of the advice is unsure. We should not try to offer globally valid 'best practices', but 'best matches' for areas with similar characteristics.

The supply side is covered by the interaction of green and digital technologies. The new EU funding period 2021-27 offers resources. Managing twin transition in Central Ostrobothnia is still not easy. The biggest gap in knowledge relates to demand side. The determinants of the use of new technologies and attitudes that support the twin transition are difficult to assess. RDI actors increase the absorptive capacity in sparsely populated areas.

Regional characteristics impact the speed of twin transition. Existing physical infrastructure is costly to change as there are irreversible investments. Plants and other sunk costs slow down the transition process. Powerful interest groups may oppose the creation of decentralised renewable energy systems.

Industry mix in Central Ostrobothnia is favourable for change. Multinational companies (MNCs) in Kokkola Industrial

Park (KIP) already feel the global pressures to establish more environmentally friendly and circular value networks. For example, a MNC is willing to give up fuel oil and use hydrogen as input in cobalt production process. Some MNCs have a complementary relation with rural areas. For example, some side streams of MNCs are used as fertilizers in agriculture. Circular economy is good for both urban and rural areas.

Rural disadvantage is sometimes a reality. One way to get over this is by 'borrowing size' from core regions through remote work. Increasing outside connections of the regions can also help. Slow innovation is possible in domains that are not connected to fashion or other trends. In bioeconomy rural can be seen as an opportunity (rather than liability). Reconceptualising rural and peripheral as relational phenomenon also helps.



TWIN TRANSITION IS BEST SUPPORTED BY A COMBINATION OF LONG-TERM PLANNING AND EXPLORATIVE ACTIONS THAT HELP THE ACTORS FIND REGION'S HIDDEN POTENTIAL. POLICY IS NEEDED TO PROMOTE LONG-TERM ACTIONS.

Rural SMEs and farms may not contribute much in inventing digital and green technologies, but they offer many opportunities to use new technologies. On the other hand, innovation mode in rural areas is mostly doing-using-interacting (DUI) and not science-technology-innovation (STI). Rural industries develop by creating new and better generations of technologies (like farm-size biogas or wind power production units), not by patenting or directly planning the optimal production unit with the help of latest science.



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POLICY OPTIONS

Smoothen the energy transition

- Central Ostrobothnia is experiencing a rapid energy transition. Machine contracting in rural areas is in trouble as peat is no longer used for energy production. Just Transfer Fund should compensate the losers by organising further education and searching for new job opportunities for low educated workers.

Encouraging combinations of distance work and multi-local living style to keep rural areas alive

- Rural policy (via travel expenses deduction) can encourage people to combine near- and distant work. If people mix living in the rural area and working in the city, they get involved both in rural and urban networks. After this double experience, juxtaposition of groups is not easy. Distance work can be used to indirectly reduce intolerance.
- Multi-local lifestyle can increase greenhouse gas emissions more than distant working reduces them. So new rural-urban lifestyle must be compensated by cutting greenhouses gases in some other sectors.

Dairy farming going from 'tradition' to 'automation'

- Specialized dairy farming in Central Ostrobothnia changes from DUI (doing-using-interacting) mode into a STI (science, technology, and innovation) mode. Transition pathways need to be supported by pilots and experiments.
- Replacing manual work with automation does increase efficiency and incomes in rural areas, but jobs disappear. In the long run we need technologies (like cobots) that support humans in their endeavours to create something new.

Revealed competitive advantage of the region needs to be supported by a process of finding new strengths

- Sectoral or cluster based regional development policy based on the traditional planning paradigm is still needed but we must also anticipate the coming changes and cater for the future needs.
- Creating an ecosystem where all the key private and public stakeholders are represented can help the region to mix current resources and create something new (products or industries).

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalization in the context of Biovalley Finland.

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Digital public administrations for future-proof rural regions

Germany is lagging behind other EU countries in terms of the digitalisation of public administration and services of general interest. At the same time, local administrations are relevant actors in exploiting the potential opportunities of digitalisation, especially in rural areas. This contradictory situation also applies to the municipality of Betzdorf-Gebhardshain, where the Rhineland-Palatinate Living Lab is located. A scenario workshop with citizens and public administration staff revealed that the Online Access Act is seen as a touchstone for future development. With this law, all administrative units in Germany must offer their services digitally by the end of 2022. A positive scenario emphasises the opportunities and possibilities of digitalisation for life in Betzdorf-Gebhardshain, while a negative scenario focuses on possible risks and challenges of the future. Both paths refer to the importance of aspects such as digital acceptance, inclusion, participation of the population and exchange between public administration and citizens.

CONTEXT

Compared to other EU countries, Germany is lagging behind when it comes to the digitalisation of public administration and services of general interest (see figure 1). One of the measures intended to remedy this situation is the Online Access Act (OAA). Almost 600 different public administration services at all levels (from municipalities to the federal government) must be offered digitally by the end of 2022.

The OAA is a challenge, particularly for rural public administrations, as their financial and human resources are limited. Furthermore, the technical infrastructures are very heterogeneous and, due to the administrative autonomy, processes are not standardised.

But digitalisation also offers a wide range of opportunities for rural areas. In addition to administrative services in the narrower sense, digitalisation can add value to services of general interest for both citizens and the local economy.

The municipality of Betzdorf-Gebhardshain, where the Rhineland-Palatinate Living Lab (LL) is located, faces the typical challenges of many rural areas in Germany. These include the exodus of young people, a lack of job and training perspectives, and the limited supply of public services.

The LL therefore explores how digitalisation can contribute to improving living conditions in rural areas. The focus is on the perspective of public administration, as municipal administrations play a central role in the digitalisation of rural territories. In particular, the LL examines the exchange between municipalities, citizens, business and civil society. Betzdorf-Gebhardshain is comparatively far advanced in terms of digital infrastructure as well as in the provision of digital services. The implementation of the OAA therefore entails potential, but also risks that need to be considered.

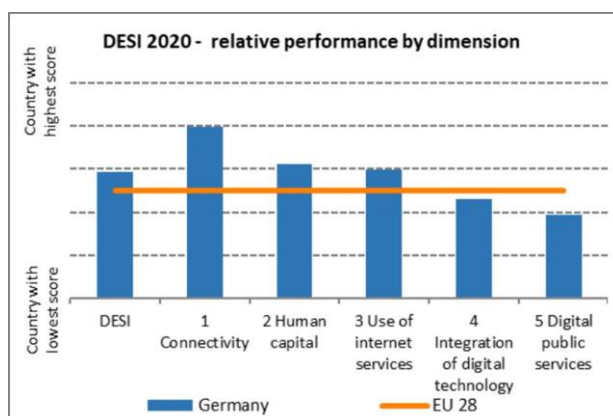


Figure 1. Germany's relative performance in different digitalisation indicators.

Source: [DESI Country Profile Germany 2020](#)

RESEARCH APPROACH

Digital means of communication have massively changed our everyday life in recent years (see Figure 2). This not only refers to the way we inform ourselves but also affects how we interact with each other. In addition to their official gazettes, public administrations now have websites and are active on social media. This illustrates that digital communication, as is widely believed, not only brings the world together, but also has a severe impact on the very local level.



A DISCUSSION ON HOW WE WANT TO LIVE TOGETHER (DIGITALLY) IN THE FUTURE IS NECESSARY AT ALL LEVELS.

This situation has given rise to the need to discuss how we want to live together as a society in an increasingly digital world in the future. This issue was explored in a scenario workshop that focused on the following question:

“What will digital living (together) look like in Betzdorf-Gebhardshain in 2031?”



Figure 2. Scene from the “Betzdorf digital” office in the municipality of Betzdorf-Gebhardshain where the Rhineland-Palatinate Living Lab is located. Copyright: Verbandsgemeinde Betzdorf-Gebhardshain.

The workshop followed the methodology of scenario planning. A set of relevant drivers of change was pre-defined, including aspects such as the demographic and economic structure or the diffusion and acceptance of digital services. On this basis, two scenarios were developed together with citizens and public administration staff. One of these refers to a positive development while the other one

describes a course until 2031 that has a negative outcome.

SCENARIOS DEVELOPED

In the positive scenario, the opportunities and possibilities of digitalisation for life in Betzdorf-Gebhardshain are emphasised: The starting point is the successful implementation of the OAA. On the part of the users, well-designed services will lead to a high rate of acceptance. On the part of the local public administration, digitalisation will make processes more efficient. Freed-up capacities can be invested in improving services of general interest. This includes better medical care, e.g. through telemedicine, or even robots employed in nursing care. The way we work is also becoming more flexible, so people have fewer reasons to migrate to cities, which benefits rural areas.

Overall, digitalisation therefore has a positive impact on all areas of life in the region.

In the negative scenario, the focus is on possible risks and challenges of the future: Unused potentials and misguided developments have set in motion a downward spiral that affects many areas. Thus, the implementation of the OAA fails in many parts. In the long term, this not only massively restricts the ability of the local public administration to proactively shape the region, but also prevents digital acceptance on the part of the citizens. Some sections of the population even feel excluded, which ultimately affects the most elementary democratic participation processes.

In the economic area, developments already known today continue unabated: Small local businesses disappear and give way to competition from the Internet, and the exodus due to the lack of job prospects increases the shortage of skilled workers. All of this contributes to ageing communities and a dwindling of services of general interest such as medical care and public transportation.

POLICY RELATED DISCUSSION

In essence, digitalisation is initially open-ended and entails both opportunities and risks. With regard to the process of exchange and interaction in the community, one example that can be mentioned here is that digital communication can lead to more anonymity if it displaces personal contacts. On the other hand, the opportunity arises to intensify exchange by allowing interaction to take place where only one-way information exchange occurred in the past (i.e. without opportunities for feedback; see Figure 3). This leads to the conclusion that the success of rural digitalisation depends above all on how the process of transformation is shaped. The scenario workshops conducted with LL members offered some suggestions for active implementation in this regard:

The expansion of the digital infrastructure is a necessary basis, but it is not sufficient. Not all municipalities in rural areas are positioned as well as Betzdorf-Gebhardshain in this respect. Nevertheless, the example of the Living Lab shows how municipal commitment can lead to success.



HOW CAN WE INVOLVE ALL PARTS OF THE POPULATION IN DIGITALISATION AND HOW CAN WE COUNTER THE SCEPTICISM OF THE POPULATION TOWARDS DIGITAL ADMINISTRATION?

In both scenarios, the crucial factor for a sustainable exchange between the public administration and the local population is the successful implementation of the OAA. In this regard, the technical component is merely one aspect. Success here also includes that both the local population and the staff in public administrations implement well-conceived processes and innovative solutions. Highly skilled staff and acceptance by the local population are further success factors.

It has also been shown that municipal digitalisation does not stop with administrative services. The area of services of general interest, too, is linked to concrete expectations. This includes the

insurance of medical care, up-to-date equipment for schools and students, as well as public transport as a viable alternative to motorized individual transport.

All of this assumes that municipalities are capable of exploiting the opportunities offered by digitalisation for the provision of services of general interest and are able to act as modern service providers. This would also counteract the “dusty” image of public administrations and increase their attractiveness as employers.

Equally necessary, however, is a local population that is willing and able to participate. On the one hand, this requires countering the scepticism about digitalised public administrations and, on the other hand, enabling participation in decision-making processes (see Figure 3).

Moreover, the communication of concrete knowledge must also be ensured, e.g., what data is stored for what purpose. So, the challenge is to answer questions such as: How can we involve as many sections of the local population as possible in digitalisation? Which exchange platforms are necessary? How can a broad understanding be achieved? How can people – and especially younger people – be motivated to get involved?

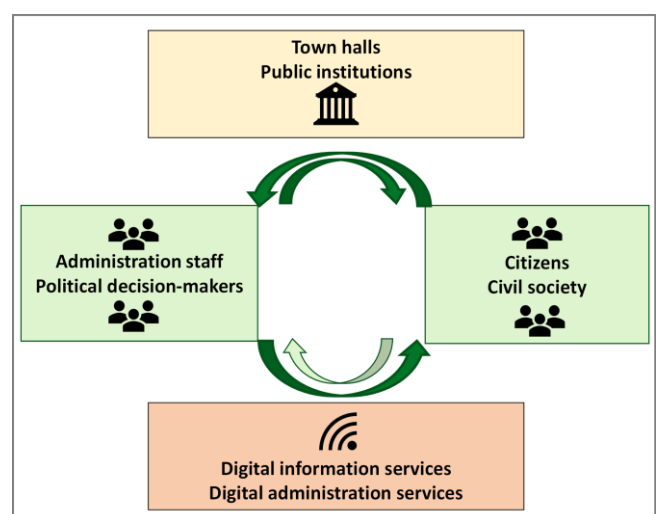


Figure 3. Exchange between public and private actors. The light green arrow indicates that digital exchange is still predominantly unidirectional.



This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

POLICY OPTIONS

Strengthening public administrations

- Ensuring up-to-date technical equipment.
- Providing resources for the success implementation of the OAA.
- Ensuring sufficient and well-qualified staff in general.
- Making digitalisation in public administration an integral part of human resources and organisational development.

Enabling participation in the digitalisation process

- Taking advantage of the willingness and interest of citizens to help shape the digital transformation.
- Defining processes and formats that allow and encourage co-determination.

Empowering citizens

- Ensuring exchange and interaction between local government and the local population.
- Providing information – e.g. on the OAA – in a way that is appropriate for the target groups and offering feedback channels.
- Promoting transparency in local public administration.
- Combating 'fake news' and preventing misinformation.
- Integrating younger people, in particular, into political work.

Creating conditions for digital acceptance by the local population and in public administration

- Allowing for a broad understanding throughout society on the topic of "What do we want and how do we want to live?"
- Promoting openness among local residents through transparency.
- Fostering the engagement of people who are actively involved in political decision-making.

Expanding digital services of general interest

- Promoting mobile working.
- Implementing incentives for home office, e.g. through subsidies.
- Expanding telemedicine services.
- Exploiting digital potential in education.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy-makers on how to support digitalisation in the context of Rural Areas in Rhineland-Palatinate, Germany.

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Geodesign in Rural Poland

«What will spatial planning in rural areas of Poland look like in the increasingly digitalised age of 2031?» was the main question approached during two interactive scenario workshops of Geodesign in Rural Poland Living Lab coordinated by the University of Lodz. This policy brief presents policy options in relation to current challenges and opportunities for rural communities in Poland in terms of spatial planning at the local level. Two most plausible scenarios discussed in details with Living Lab representatives describe the future of 2031, and in both cases, policy intervention is needed. The first, worse-but not worst („bad”) «Pause scenario» assumes technological progress in terms of spatial planning but no will or skills for social participation in this process. The second, better-but not best („good”) «Re-record scenario» draws a vision of rural communities ready and willing to participate in spatial planning process, however having no access to proper technological solutions. The policy options, considering both scenarios should aim at: 1) bridging the urban-rural digital gap; 2) raising local communities’ awareness of participatory planning in the context of digitalisation; 3) developing new digital channels for public consultations and participatory planning; and 4) favouring digital inclusion of rural areas.

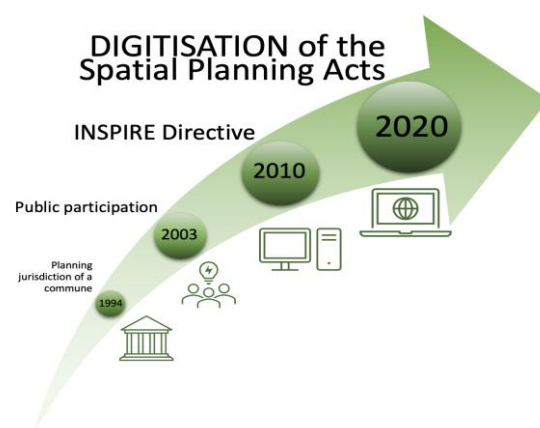
CONTEXT

Poland is one of the countries in the region that, due to its digital potential, might be considered as the European Digital Challenger. The level of digitalisation, measured by fixed broadband coverage, Network Readiness Index (RDI) or Digital Economy and Society Index (DESI) in Poland is far lower than in the case of Digital Leaders from Northern and Western Europe.

The most important problem, well visible in DESI reports, is the rural-urban divide. Nonetheless, Poland has strong foundations to accelerate the digitalisation of its economy. There are a few areas that should and are addressed by government agencies in order for Poland to fully use its digital potential. Several policies and initiatives that have already been undertaken focus on developing digital skills and the use of digital tools by the entire Polish population, companies, and the public sector, increasing the number of ICT specialists and lifelong learning activities of employees, supporting innovations, providing legal, political, and business environment for smart (rural)

development.

The development of mechanisms in spatial planning in Poland has started from new, decentralised model of spatial planning being a direct response to political and economic transitions of the country in early 1990s; through participatory approach to spatial planning inviting local communities to actively take part in land management, especially in local scale; and finally focusing on digital technologies that can be regarded as a booster of GeoDesign approach in spatial planning today.



RESEARCH APPROACH

One of the most severe challenges for rural communities in Poland is spatial planning at the local level, understood as an instrument of spatial policy implementation – one of the local government units' tasks. Until the 1990s in Poland, the system of spatial planning was based on central planning rules. Participatory planning, considering negotiations and consultations between actors representing the national, regional and local level, has only been introduced recently.



STANDARDISATION, INTEROPERABILITY, AND COMPATIBILITY OF SPATIAL DATA ENABLED PUBLIC PARTICIPATION IN PLANNING PROCESSES

Thus, we defined the following scenario question: *How to enhance participation in rural planning? And how can digitalisation improve the involvement of local communities in spatial planning processes?*

This question was approached in two interactive workshops. Scenario workshops were conducted along the event organised by the DESIRA team at the University of Lodz under the auspices of the Marshal Office (regional government). The two-day seminar, held in person, focused on innovative research in rural areas influenced by global challenges.

The finalised scenario question was: **What will spatial planning in rural areas of Poland look like in the increasingly digitalised age of 2031?**

SCENARIOS DEVELOPED

To name scenarios for future development of GeoDesign approach for spatial planning in rural areas of Poland, we used symbols of reel-to-reel audio recorder controls: Play, Pause, Re-Record and Fast-Forward. We considered possible configurations of two groups of the most influential drivers of change as discussed over the first workshop: 1) social drivers focused on level of digital literacy and will to participate in spatial planning process and 2) technological drivers covering various tools dedicated to participatory model of spatial planning, i.e. internet connectivity, platforms, apps and their usage.



Two main scenarios are: "Pause: full digital toolbox but no participation" and "Re-record: full participation but no digital toolbox". Both are plausible scenarios but describe the future where the intervention is needed. In the "Pause Scenario" the main factor will be the aging of local communities and the migration of young people. This will have a significant impact not only on the economic situation but also on the processes of adapting technological innovation. The IT infrastructure will be well developed and the digital management tools for local systems will be available. However, the problem will be the deepening dichotomy between technological development and social perceptions, as well as the willingness to accept and take advantage of the opportunities that digitisation brings.

The "Re-record Scenario" is based on the assumptions that the rural population will be stable and the IT infrastructure and digital tools will be well developed. The problem will be the technological change that will require constant adjustment not only in terms of society but also in terms of tools. Maintaining the IT base and tooling equipment will be very expensive, which will result in a very strong barrier to the further development of rural communes related to the availability of new technologies. Rural space will be a diversified space, more and more distant from the spatial pattern based on the center-periphery dichotomy. The digitalisation will be a key local game changer. Rural communes will form a spatial mosaic composed of various types of digital management.

POLICY RELATED DISCUSSION

Poland has a strong regional character, i.e. social, cultural and economic features are spatially diversified. This regional differentiation has very characteristic patterns, which in the case of the technological development shows great variation between the center and the periphery. The centers are predominantly urban in character (large cities and spheres of direct influence in the form of urban functional regions) and the peripheries are predominantly rural. Determining the basic trends leading to the consolidation of technological achievements and the transition towards universal digitalisation must consider social barriers, as well as relate to demographic issues (mainly aging) and psychological issues (mainly resistance to changes).



THE GROWING AWARENESS OF THE ESSENCE AND IMPORTANCE OF SPATIAL PLANNING IN IMPROVING THE QUALITY OF LIFE LEADS TO INTEREST IN GEODESIGN PROJECTS, WHICH INCREASES DIGITAL SKILLS

The main issue will be to accelerate the social process of adaptation to technological change by convincing local communities about the benefits of digitalisation in terms of understanding, controlling, and changing spatial development and land management.

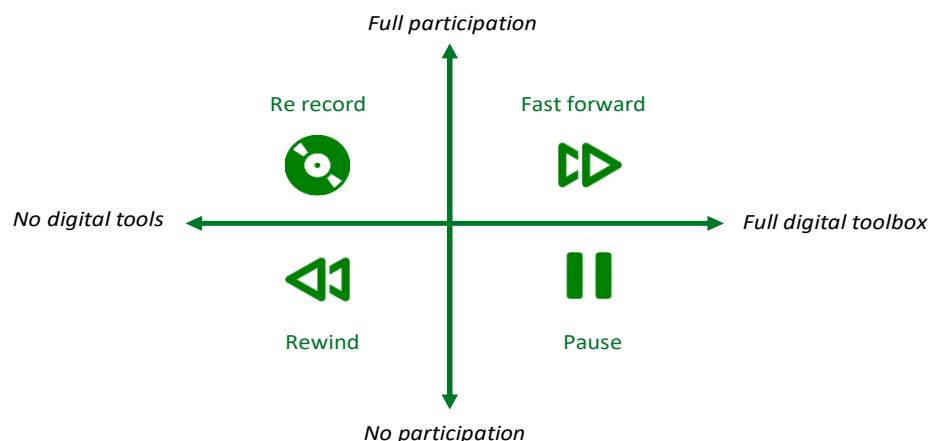
It is expected that the social dualism may have spatial implications and turn into territorial dualism, i.e. the benefits of digitalisation will be used by well-educated communities with greater potential to act whereas highly depopulated, remote rural

areas, due to the weakening social potential, may "miss their chance".

Rural communes that achieve a sufficiently high level of development will enter the path of a balanced spatial policy. Communes that do not take advantage of these opportunities will plunge into planning chaos, due to social conflicts and the lack of skills to use digital tools to solve them.

Combining new opportunities for universal and free sharing of spatial information with the involvement of local communities is a driver for the idea of GeoDesign, reflecting the "smart" approach in spatial planning and should be the goal of local authorities responsible for spatial planning on a local scale. The GeoDesign concept assumes that thanks to more integrated tools for acquiring, analysing, and visualising spatial data (also in 3D format), it is possible to design several alternative land development concepts to be assessed both by specialists and members of local communities. As a result, the project's final shape is no longer decided by the designer or a group of decision-makers but by the whole society.

Many policies and initiatives have been undertaken by both the state and private institutions in order to support the rapid digitalisation of Polish society, boosting digital literacy and tackling the digital divide. The extent to which these policies support rural regions will depend upon their implementation as rural digitalisation has so far not been a topic of concern for the government, and there is little information available on studies or policies directly addressing rural areas.





This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

POLICY OPTIONS

Bridging the urban-rural digital gap

- The attention should be given here to remote rural regions with the relatively slower connection speed and low access to broadband when compared with urban or sub-urban areas.

Raising the local communities' awareness of participatory planning in the context of digitalisation

- The main issue should be to accelerate the social process of adaptation to technological change by convincing local communities about the benefits of digitalisation in terms of understanding, controlling, and changing spatial development and land management.

Developing new digital channels for public consultations and participatory planning

- Until 2020, Poland had no regulation indicating the need to create GIS data for planning documents. As of October 31, 2020, new provisions require the authorities responsible for the spatial planning acts to create GIS datasets. This obligation also applies to acts already in force. Still, not many rural areas offer digital tools used in participatory planning (geo-questionnaires, geo-discussions) or engage social media in the planning process.

Favouring digital inclusion

- It is highly recommended to reframe current general policies focused on digital transformation of the country, so that they well answer needs of vulnerable groups and rural regions (especially in peripheries) supporting their digital connectivity and skills.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalisation in the context of Geodesign in Rural Poland.

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Beef Farmers and Digital Marketing

Latvia's high-quality beef sector has gone through substantial structural changes (export growth, the growing prominence of direct sales, established auction houses, etc.), shifts in consumer preferences and contextual socio-economic and political turbulence. The two main challenges, however, are the shrinking population and consumers' unwillingness to pay for high-quality products.

To resolve these challenges, the Living Lab (LL) in Latvia is looking for ways digital tools could be used to communicate directly with consumers. Digital solutions could help beef farmers to communicate the positive social and limited environmental impact of cattle farming in Latvia and the high quality of beef produced by Latvia's farmers.

In the frame of the LL, a future scenario planning workshop was held in August 2021. During the workshop, a scenario question, focusing on the possible situation in 2031, was raised: *"How to make use of the potential inherent in digital marketing for selling beef?"* During the workshop, two scenarios were developed: "Vicious circle" (a scenario containing numerous opportunities yet also containing considerable uncertainties related to potential outlet markets for beef produced by Latvian farmers) and "Penetrating niches" (a scenario that illuminates beef farmers would need to be proactive if they wanted to remain relevant in the future).

Farmers have established channels to communicate with consumers. However, these channels often cannot be upscaled. Upscaling requires broader structural shifts.

CONTEXT

The DESIRA Living Lab (LL) in Latvia aims to develop an innovative support system with the use of digital tools for the recognition and traceability of beef in order to improve and extend the market reach of Latvian cattle farmers. Specifically, the LL focused on a digital marketing strategy aimed at communicating the characteristics of Latvia's beef to consumers and farmers, and the reasons for the high price of high-quality beef.

The beef market in Latvia has numerous characteristics that make it an interesting case for a Living Lab approach. Although Latvian farmers can produce a substantial amount of organic beef, only a small number of consumers are ready to pay for high-quality beef meat. Digital solutions could help beef farmers to communicate the positive social and limited environmental impact of cattle farming in Latvia and the high quality of beef produced by Latvia's farmers. Digital tools will aid in targeting consumers willing to pay extra for high-quality meat: there is a niche market

of consumers that are willing to pay for products of high quality with low environmental impact, but it appears to be difficult to reach this group using traditional forms of marketing.

The sector has gone through substantial structural changes (export growth, the growing prominence of direct sales, established auction houses, etc.), shifts in consumer preferences and contextual socio-economic and political turbulence. The domestic market has been shrinking. This has been caused by the shrinking population on the one hand and changing dietary preferences on the other. In the last two decades, the average consumption of beef per household member per year has halved in Latvia. In this unfavourable context, some beef farmers have been trying to sell their products locally. The most prominent beef cattle farmers organisation is the Society of Beef Cattle Farmers (*Gajās liellopu audzētāju biedrība*), consisting of 265 members.

RESEARCH APPROACH

A future scenario planning workshop was held in August 2021. During the workshop, the following scenario question was discussed: **"How to make use of the potential inherent in digital marketing for selling beef?"**. Before and during the workshop, two case-specific scenarios and two generic scenarios describing the best and the worst possible situations were developed. To develop the two case-specific scenarios, we identified a list of drivers (of change) affecting the processes.



TO BENEFIT FROM DIGITAL TOOLS, SMALL HIGH-QUALITY BEEF FARMS WILL NEED TO COOPERATE. COOPERATION WILL HELP TO ACCUMULATE RESOURCES NEEDED TO DEVELOP COMPLICATED SOLUTIONS.

The list of drivers used to characterise the two case-specific scenarios was developed by identifying one or two drivers for each of the following domains: Social, Technological, Environmental, Economic, Political. The following drivers were used to develop the scenarios: (1) New diets; (2) animal welfare; (3) social media and social networks; (4) extreme weather; (5) prevalence of bovine diseases; (6) solvency of the population; and (7) support for environmentally friendly practices.

For each driver, two statements were made. The statements for the scenario frameworks were developed in an iterative process. Sets of statements describing driver-related shifts were used as the basis of the two case-specific scenarios. The statements were selected keeping in mind, that linked together, emerging scenarios would need to appear plausible, while also ensuring that none of the scenarios would automatically seem as significantly more desirable or more probable. Instead, in each scenario, some welcome changes were accompanied by shifts that created new challenges to producers.

SCENARIOS DEVELOPED

During the workshop, the participants named the first scenario "Vicious circle". This scenario creates numerous opportunities, but participants noted that there is considerable uncertainty vis-à-vis the market for beef produced by Latvian farmers. In other words, the participants vacillated between Latvia as the main market and the export route. The second scenario was named "Penetrating niches". Participants suggested that high-quality beef farmers would need to be proactive if they wanted to benefit from this future. The challenge of the future captured by the second scenario, as it was defined by farmers, is that there seems to be no natural market that high-quality farmers could benefit from. However, on the other hand, consumers are more interested in niche products in general and can pay for high-quality products.

The scenarios illustrate a number of challenges that the sector is facing – including consumers' lack of trust, shrinking natural markets (negative population growth in Latvia) and limited demand for high-quality beef, changing dietary habits and farmers' unwillingness to cooperate.

The ability to communicate the value and characteristics of Latvian beef in a clear and enticing manner can help overcome these challenges. Farmers need to reframe cattle farming as an integral part of the landscape and dispel misconceptions about the way beef is produced in Latvia. Also, farmers need to encourage consumers to learn about products and different ways of preparing them. Digital tools offer game-changing marketing solutions that will allow farmers to strengthen their market position. Successful cooperation can help farmers to fully benefit from these tools.



POLICY RELATED DISCUSSION

Workshop discussions illustrated that there are clear problems that the sector and policy-makers could engage in for the sector's performance to be improved:

The beef produced by farms, following practices producing high-quality beef, is more expensive than conventional meat. The costs of the beef are due to organic farming practices and the choice to work with grass-fed and pasture-raised carnivores. However, consumers are poorly informed regarding the aspects of meat quality and have limited cooking skills when it comes to various pieces of meat. Consequently, producers struggle to justify prices that would be significantly higher than those asked for conventional meat. Recognizing this problem, individual producers and producers' groups have started to engage with consumers by trying to communicate various recipes and to develop a narrative of what high-quality beef production is. However, a political choice might be to add additional pressure on farms that are following conventional practices, thus facilitating an increase in price for all meat products.

While beef producers are located in the countryside and often quite far from the large cities, the main consumers (those able to pay extra for a better product) are living in cities. This complicates logistics. Most farmers have introduced a version of a digital ordering system (ranging from less sophisticated WhatsApp chats or Google spreadsheets to fully functional online shops). However, these systems might be difficult to upscale and impossible to link to other systems, for example, document products that are currently in store.

Additionally, the distance between the farm and the consumers increases delivery costs and the ecological footprint of the supply. These costs could be reduced if farmers were collaborating when planning deliveries. There are already groups of farmers trying to establish joint logistics

planning allowing farmers to deal only with consumers who are closer to the farm while not losing profits. Developing tools supporting logistics planning could be a helpful instrument to other small farmers looking for a way to cut costs on deliveries.



COMMUNICATION WITH CONSUMERS DOES NOT STOP WITH ENSURING THAT FARMERS' MESSAGE REACHES CONSUMERS. THE COMMUNICATION NEEDS TO BE SUPPLEMENTED WITH STRUCTURAL CHANGES IN A WAY THAT THE SECTOR OPERATES EFFECTIVELY.

For farmers to be able to cooperate around joint logistics (including joint webpage to sell the product and joint logistics) they need to ensure that products maintain the same quality across all engaged farms. This requires developing standards of quality and agreements on the main products marketed. This standardisation most likely has to come from farmers and policy-makers cannot introduce it. However, farmers are struggling to do this.





This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

POLICY OPTIONS

Strengthening digital skills

- Farmers agree that they need to ensure that their farms are 'online', e.g. by using social media, having a homepage, etc. However, many of the farmers represent generations that were introduced to digital tools late in their lives. Although for some of them online communication comes naturally, others are complaining that this task takes an un-proportional share of their time and causes stress.
- For some of these farmers, courses helping to improve their skills might be helpful. However, others would prefer if specialised enterprises were providing these services to farmers so that farmers would not need those skills.

Rethinking traceability

- A system is in place that allows consumers to trace meat products they have bought. Such a system is maintained by the state and it is based on data that farms have to declare to monitoring organisations.
- Unfortunately, the existing solution is not user friendly and few consumers are informed about it. If the system was improved to be friendlier to use, it could help farmers to communicate with consumers.

Focusing on the context

- The sector is in the middle of restructuring itself. Currently, at least two farmers' cooperatives are being developed. Farmers are mobilising to resolve sectoral challenges on their own. To support them, policy-makers need to address the contextual related issues.
- Many of the core issues farmers are dealing with are not related to the characteristics of the sector. Instead, they are rooted in contextual processes that affect other agricultural sectors as well.
- Some of these contextual issues are negative population growth, consumers price sensitiveness, significant price differences between conventional and products that have been produced responsibly. Policy-makers need to take a stronger stand while working with these challenges.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalisation in the context of high quality beef in Latvia.

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Digitalisation of fruit production in Germany

This policy brief presents the results of stakeholder interviews and workshops conducted in the Living Lab (LL) of the Lake Constance region. The guiding question of this LL was **"How can digitalisation contribute to sustainable fruit production by 2031?"**

In this context, two scenarios were elaborated. The "Better but not best" (BnB) scenario assumes high availability, acceptance and implementation of digital fruit production technologies with positive socio-economic impacts but low environmental improvements. The "Bad but not worst" (WnW) scenario assumes low availability, acceptance and implementation of digital fruit production technologies with negative socio-economic impacts and environmental benefits.

Four policy measures required to harness the potential of digitalisation for sustainable development in fruit growing have been identified: (1) Holistic and independent evaluation of individual and overall digital solutions, (2) improving the applicability and affordability of digital solutions in family farms, (3) developing a legal framework to regulate data security and data sovereignty, (4) developing digital infrastructure in rural areas, and (5) promoting digital skills.

CONTEXT

The most popular fruit among German consumers is the apple. Every fourth apple consumed in Germany comes from the Lake Constance region. It is one of the largest fruit-growing areas in Germany. Consumers want high-quality and healthy apples. They should always look the same and be available freshly harvested all year round. At the same time, they should be cheap, environmentally friendly and produced regionally. Due to these different consumer demands, family fruit farms in the Lake Constance region are faced with ecological, socio-economic and structural challenges. The biggest are the availability of reliable and cheap seasonal labour, the need to reduce pesticides and maintain biodiversity, and weather extremes due to climate change. These challenges put pressure on family farms to adapt their current practices. Digitalisation is seen as a promising development to address these challenges. Among others, autonomous driving tractors, spraying drones and fruit harvesting robots are being tested for their applicability. The current main needs identified by the Living Lab (LL) Bodensee can be summarised as follows:

1. More sustainability and regionality in fruit production through digitalisation.
2. Develop laws and standards for compatible, reliable and secure management and storage of sensitive data and information while respecting property rights.
3. Improve access to easy-to-use and affordable technologies for automated and accurate management and monitoring of fruit production for family farms.
4. Expansion and improvement of infrastructure for high-quality data access in rural areas.
5. Promote digital literacy and lifelong digital education for fruit growers and their advisors.

The main policy measures identified in the Lake Constance LL to achieve these goals are (1) supporting the development of digital technologies that are adaptable and applicable to family farms and (2) strengthening digital infrastructure and skills for sustainable, fair and affordable regional fruit production by family farms.

RESEARCH APPROACH

The aim of the LL Bodensee was to anticipate possible developments in the next decade. The focus was on different transformation paths that integrate the expectations, concerns and knowledge of stakeholders and decision-makers and offer food for thought and discussion.



THE LL BODENSEE SHOWS HOW DIGITALISATION CAN CHANGE REGIONAL FRUIT PRODUCTION ON FAMILY FARMS OVER THE NEXT TEN YEARS.

The LL Bodensee conducted an online scenario workshop in November 2021. There, the drivers of digital change and different future paths were identified and the narratives for different scenarios were developed. The scenario guiding question of the narratives was: **How can digitalisation contribute to sustainable fruit production by 2031?** The workshop participants identified two main scenarios characterised by different plausible developments of the socio-economic, ecological, political and technological influencing factors. In addition, two extreme scenarios relating to "utopian" and "dystopian" visions were presented.

DEVELOPED SCENARIOS

The workshop participants developed scenario narratives based on two intermediate scenarios. These included the "Better but not Best" (BnB) scenario, which considers high availability, acceptance and implementation of digital fruit production technologies with positive socio-economic impacts but environmental drawbacks. The "Worse but not worst" (WnW) scenario assumes low availability, acceptance and implementation of digital fruit production technologies with negative socioeconomic impacts and environmental benefits.



In the BnB scenario, the needs of family farms are taken into account in research and development. They can choose between different cost-effective technologies. The cost-benefit ratio of digitalisation improves and fruit farms can reduce the need for seasonal labour and increase the attractiveness of their family farms for farm successors, which facilitates the continuation of traditional fruit farms. Digitalisation can reduce the need for pesticides, promote biodiversity conservation, and improve the image of fruit growing and the regional attractiveness for local recreation and tourism.

In the WnW scenario, digitalisation is rejected due to concerns about data sovereignty and security, but the farms are partly forced to digitalise by the market. Another concern relates to the negative image of industrialised fruit production away from nature, with negative effects on the landscape, local recreation and tourist appeal. Family farms are being left behind by digitalisation, as the acquisition of skills is expensive and time-consuming. Biodiversity continues to decline due to high-tech cultivation and increased interventions to protect production from climate-related weather influences. Digitalisation on family farms is not economically viable due to the high costs, even with state support, as this is too low.

POLICY RELATED DISCUSSION

During the LL workshop, stakeholders were encouraged to identify policy actions based on the following questions: **"What actions would need to be taken if we want to benefit from plausible future opportunities or mitigate risks that the future might bring?"**

Later, participants considered whether the policy measures and ideas from the BnB scenario would also be effective in the WnW scenario and vice versa. As a result, policy recommendations were identified, whose are potentially effective for both scenarios since they promote opportunities in the BnB scenario and mitigate the risks in the WnW scenario.

A key measure is political support for flexible technology development adapted to the needs of family farms. These include the promotion of cooperative cross-farm digitalisation approaches and independent advisory facilities for family farms.

In both scenarios, an improvement of the digital infrastructure and the competence and service network in rural regions is required to enable continuous and high-performance data transmission and high-quality digital applications.

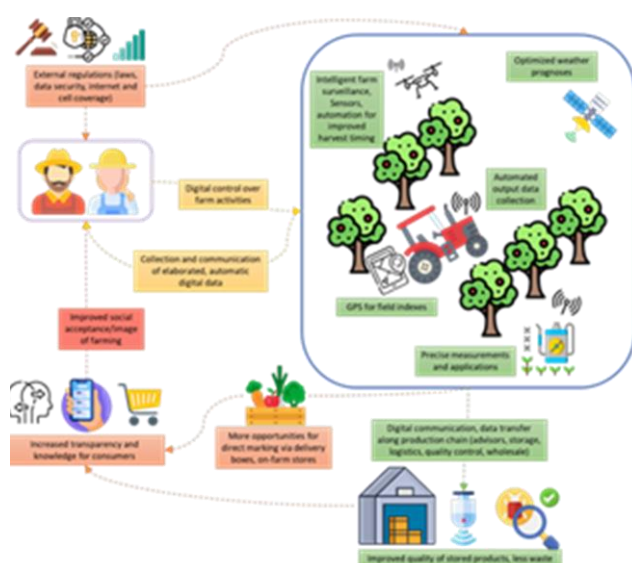
There is uncertainty about how family farms can benefit from digitalisation. It is hoped that digitalisation could help to optimise the processes of sustainable fruit production with high quality and low labour and environmental impacts, while at the same time taking into account societal goals such as the preservation of biodiversity and the recreational value of the landscape.

One of the biggest challenges in both scenarios is to improve standardisation, management, security and sovereignty of the collected data and sensitive information in order to overcome the scepticism of fruit growers towards digitalisation.

In both scenarios, family farmers are threatened by the high demand and rising minimum wages for foreign seasonal workers for fruit harvesting and the associated bureaucratic burden. However, the digital technologies developed do not always meet the expectations and requirements of family farms.



PRIORITY IS GIVEN TO IMPROVING THE DIGITAL INFRASTRUCTURE AND SKILLS OF FAMILY BUSINESSES AS WELL AS PROMOTING THE COOPERATIVE USE OF DIGITALISATION SERVICES.



Decision-makers in politics, administration and business should develop well-resourced and suitable support measures and facilitate investment in the digitalisation of family businesses.

The image of fruit farms could improve if process-related environmental impacts in orchards are reduced through digital technologies.



This policy brief has been prepared for the European Commission under the terms of Grant Agreement No. 818194.

POLICY RECOMMENDATIONS

Holistic and independent evaluation of individual and overall digital solutions

- We recommend an inter- and transdisciplinary technology development with experts, stakeholders and practitioners to assess the advantages/disadvantages and applicability of individual technological solutions as well as a coherent overall system and its integration into cooperative structures from a techno-economic, legal, ecological and social perspective. This concerns sensor-assisted apple harvesting robots, autonomously driving tractors for crate transport, mini-drones for monitoring and maintaining the plant stock and for preserving biodiversity.

Improving the applicability and affordability of digital solutions in family businesses

- We recommend supporting the development of technologies and new concepts to improve the applicability and affordability of digital technologies for family farms, in order to prevent a technological push from "outgrowing" them and accelerating structural change.

Development of a legal framework to regulate data security and data sovereignty

- We recommend the development and improvement of legal and regulatory tools to promote an ethically responsible and standardised approach to the values and requirements of family businesses in the areas of data protection, cyber security and artificial intelligence. This should actively address their concerns about losing control over data sovereignty, data and process management and independent management competencies.

Expansion of the digital infrastructure in rural areas

- We recommend a rapid expansion of broadband access in rural regions as a prerequisite for the digital collection and analysis of data and process control. Without a fast and reliable internet connection, family farms in their sometimes remote orchards cannot take advantage of the opportunities offered by digitalisation.

Promotion of digital competences

- We recommend improving the digital skills of family businesses through government support for education and training, and supporting the use of professional and independent digital advisors.

This policy brief is published as part of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalisation in the context of fruit production in Germany.

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European Roundwood Traceability

The European Timber Regulation (EUTR) is an instance to consolidate European efforts to halt illegal logging practices. Its aim is to ensure that timber and timber-related products on the European market are legal. When reviewing the current EUTR, the most fundamental needs are common national EUTR-standards amongst countries of the European Union, which currently do not exist. Common standards define the minimum requirement of establishing a more technology-based, unified implementation of the EUTR. In addition, there is a need of a game-changing technology, or a combination of technologies. Currently, no efficient, affordable, easy to use, globally available technology has prevailed or gained majority in usage, which would make traceability of wood simple.

Looking into the future, it is possible to define two potential scenarios of roundwood traceability for Europe, a 'sustainable way' or an 'exploitation way'. The truth most likely lies somewhere in the middle of those two pathways. The question addressed together with Living Lab members was: Will timber traceability move into the limelight as a tentative attempt to cover-up illegal logging practices, or, as a confirmation of legal, sustainable practices?

CONTEXT

Austria has a strict, long-existing forest law guaranteeing sustainability: The word sustainability originates from the domain forestry itself and is defined as guaranteeing more growth than felling. Nevertheless, to fulfil the yearly demand of roundwood, timber is acquired from the European and international market. This poses the threat of placing illegal deforested products on the European market, which is what the European Union Timber Regulation (EUTR) is tackling; illegality is not only defined as cutting down endangered tree species, but also breaching national forestry laws. While forestry is a domain which undergoes and partially has already undergone a process of digitalisation, the level of digitalisation within the implementation of the EUTR is rather low. This led to the definition of the following focal question: "How can digitalisation support and enforce the adoption of the European Timber Regulation (EUTR) concerning imported round wood in Austria?"

The effects of digitalisation concern the availability of information and the way information is exchanged and communicated. Digitalisation allows information to travel faster; generally speaking, transparency counters clandestine activities. Contrarily, an abundance of information needs efficient data filtering, storage and distribution. Forestry is a domain which is experiencing a high degree of technological advancement, only, the institutional circumstances are not there yet, for technological innovation to gain importance when tackling illegal logging.



RESEARCH APPROACH

The activities of this Living Lab evolve around past, current and future efforts to limit illegal timber trade. To elaborate potential future scenarios of timber traceability in Europe, dedicated scenario workshops were held. The focal question of the workshops was: **“What will timber tracking look like in 2031 in Europe?”** This question allows creating a broad context where processes and all relevant specificities can be explored, and where stakeholder’s imagination of a future state can be articulated, but it also sets the agenda for the discussion by making a focal point.

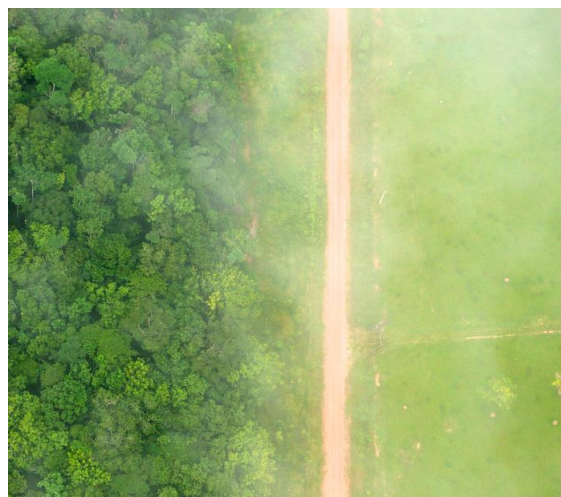


DIGITAL TECHNOLOGIES POSE A GLOBAL SOLUTION TO TACKLE ILLEGAL TIMBER TRADE

To describe the entities active in the scenario of wood traceability, we draw back on the concept of the Socio-Cyber-Physical System (SCP). The socio-domain of the SCP is composed of the entities dealing with timber, the countries involved and the supervisory authorities. The cyber-domain includes digital technologies used to perform checks on legality. The physical domain comprises all the elements of the forests and timber. Currently, the SCP can be viewed as a struggle of economic interest versus natural interest (physical domain), with a referee trying to keep things in order.

SCENARIOS DEVELOPED

The two main scenarios developed with LL members are the **‘Exploitation scenario’** and the **‘Sustainability scenario’**. The notion of the Exploitation pathway follows the idea of making use of the commodity forest in a non-sustainable way. It involves generating a **profit** at the expense of others. In this scenario, **nature is on the decline**. Contrariwise, the idea of the **Sustainability** pathway evolves around the principle of less consumption than **growth**. The core of this scenario represents a sustainable approach to nature, which has a positive impact on the issue of wood tracking.



In the Exploitation scenario, winners are clearly the economic entities looking for raising their profits. The environment experiences increases pressure, resulting in a constant loss of biodiversity. The technological and political drivers of change in this scenario are missing to come to the aid. The last resort for assistance are measures such as the designation of nature conservation zones. The increasing demand is driving **illegality**. One option to halt an increase in illegality is provided by the component of **digital technologies**. External technological advancement could have a positive effect, enabling to lessen the prospect of the negative impacts.

In this second scenario, sustainability is becoming more and more important. This in turn has a positive effect on nature. Driven by the removal of bureaucratic barriers, technology gains momentum, existing technologies are advanced, and new technologies are developed. As a result, forests benefit from this development, as they have more room to thrive and breathe. Companies have to reorient themselves to a certain degree. They must learn to jump on the sustainability bandwagon and make it work for them. This means opportunities as well as challenges; potentially financial challenges for consumers and industry can also be seen as opportunities.

POLICY RELATED DISCUSSION

The European Union Timber Regulation (EUTR) includes due diligence requirements and a prohibition on illegally sourced timber entering the EU market. The EUTR places responsibility on the individual or organisation placing the timber on the market to conduct due diligence, in order to ensure that the timber is in compliance with the laws of the country where it is harvested.

The main barrier for the establishment of a more technology-based EUTR is the lack of national standards and incentives. Without a common denominator, it will not be possible to establish common technology-based practices amongst participating countries of the EUTR.

In theory, basic prerequisites already exist: Forestry is a domain which is experiencing a high degree of technological advancement; observational data is abundant, technologies to track single objects are on the verge of reaching maturity, connected technologies such as blockchain or Internet of Things (IoT) are gaining importance. Connectivity allows for information to travel fast and wide and only the institutional circumstances are not there yet in order for technological innovation to gain importance.



GLOBALLY APPLICABLE SOLUTIONS NEED TO BE FOUND TO GUARANTEE TRANSPARENT AND EFFICIENT TIMBER TRACEABILITY

A way to circumnavigate this situation could be to generate incentives, rather than punishments; new certificates or quality labels could evolve from wood products which were tracked using digital technologies and hence guarantee legal compliance; and companies, who utilize certain technologies could obtain tax reliefs. Such conditions could even have the potential to drive technical innovation through showcasing good practice.

Action is required not just at the national level, but also at the EU level. Member States should reaffirm their commitment to effectively monitor the EUTR's implementation and to take appropriate measures in the event of violations, such as administrative or criminal actions and sanctions. Instead of being only a declaration of good intentions, the EUTR must be a truly effective tool.

Enforcement is critical to the effectiveness of preventing illegal wood trafficking, especially through the EUTR. Cooperation is a crucial tool for assisting with enforcement. This collaboration can take various forms, with one important area being cooperation between customs administrations in importing and exporting nations, as well as other relevant government agencies. Information gathered through e.g., digital technologies and confirmed on the ground by external parties, such as independent civil society monitors, is also critical.





This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

POLICY OPTIONS

Adaption of the policy regulations concerning the EUTR

- An amendment of the EUTR and a subsequent implementation of the reform could serve to establish national uniform standards and enforce a change of current due-diligence procedures.

Incentives to deploy a more forge-proof due-diligence-system (DDS)

- The current DDS heavily relies on paperwork, which is prone to forgery. Alternatives to verify the origin of wood, e.g., tagging and use of blockchain technologies, would guarantee more effectivity and efficiency in ensuring legality. Incentives could be e.g., stricter policy regulations as well as tax reliefs for voluntary application of digital technologies for traceability.

Technological training

- Commitment of controllers in the responsible authorities who are forestry specialists and/or have a thorough understanding of supply chains, as well as multidisciplinary training sessions with external experts, are regarded as best practice and should be enforced.
- Increased capacity at the national level is needed to provide excellent operator coverage and allow for regular and frequent checks.
- Education efforts should be stepped up to ensure that operators have a better awareness of the EUTR and of their responsibilities.

Foster cooperation within and between countries

- There is a lack of formalised cooperation and timely communication between countries and among officials of the enforcement chain within countries. Setting up exchanges between countries or joint inspections could represent good practices.
- Cross border collaboration and regular exchanges between different authorities involved should be made possible and improved.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalisation in the context of roundwood traceability in Austria.

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Digitisation: Economic and Social Impacts in Rural Areas (Hungary)

The need for digitalisation is urgent in Hungary. A significant part of the country's territory has rural characteristics. In these areas, agriculture has a key role to play in generating income and improving the social situation. However, new trends on digitalisation have also affected agriculture. The role of digitalisation in reducing the agricultural impact on the environment is increasing and substantially shapes the EU's future agenda. Serious deficiencies are however experienced in digitalisation in Hungary within the field of agricultural infrastructure and human capital.

This policy brief focuses on Hungary, especially the North Great Plain region. Following a Living Lab approach involving stakeholders, two possible future scenario are considered, a positive and a negative one. In the positive scenario, the agricultural workforce is able to acquire the right digital skills and keep pace with digitalisation developments. In the negative scenario, precision technology will remain costly; therefore, small-scale producers will not be able to reap its benefits. In each case, the policy options focus on building a digital economy where the workforce has the skills needed for digitalisation (especially precision) technologies.

CONTEXT

According to the latest 2020 preliminary agricultural census results, digitalisation is not typical for Hungarian farmers. Farmers use computers mainly for banking and electronic document management, but their share remains below 30%. The use of digital devices in all age groups was mainly aimed at banking, in addition to the use of electronic documents and general office software; but the proportion of these items was also found to decrease with advancing age. The use of precision instruments was critically low in Hungary. The most commonly used tool was the crop condition survey, but its share was only 5.3% among farms. The use of guided/automatic steering, differentiated work operations and general environmental sensors was also widespread, but their share did not reach 4%. Surprisingly, out of 164 thousand farmers, more than 123 thousands did not use these tools as they do not think that they need it, while 22 thousand farmers did not have the necessary knowledge. Only 18 thousand farmers said that the technology was expensive, that the tools in the farm were not suitable for their use, or that they did not use precision agricultural tools due to the limited training and advice available. Young farmers cited the high price of

technology as the second most important barrier, while older farmers tended to lack up-to-date knowledge. These trends reflect general digitalisation skills. It is expected that in the future 9 out of 10 jobs will require digital qualifications while 44% of the population of the EU do not have any digital skills (EIP-AGRI, 2020). One of the key topics of digitalisation in Hungary is the possible role of precision agriculture (PA) in terms of efficiency and profitability. Precision Agriculture (PA) is a farming management concept based on observing, measuring and responding to inter and intra-field variability in crops (or to certain aspects of animal rearing). The primary benefits to be obtained are chiefly due to increased yields and/or increased profitability of production to the farmer. Other benefits derive from better working conditions, increased animal welfare and the potential to improve various aspects of environmental stewardship. However, its spread is greatly hampered by differences in farm structure and the heterogeneity of farms (EUROPEAN PARLIAMENT, 2014). 82% of the 4.8 million ha agricultural land was made up of arable land. For all types of farming, the age composition was similar. 60-65% of all farm managers were at least

40 years old, and 20-25% were older than 65 years of age.

Examples from all over the world support the view that there is a place for the use of modern technologies in agriculture independent of the size and field of activity of farms. The introduction of the advances of precision agriculture, and later of automation and robotisation, can increase the profitability of agricultural production, thereby increasing the attraction of agriculture in terms of labour supply. In addition, changes in agricultural production present new challenges for workers: A high proportion of workers currently employed in agriculture as well as of self-employed farmers do not have the appropriate skills and knowledge to be able to handle modern technologies. Further, the phenomenon of ageing is particularly common among agricultural workers, which paints a dark picture as to the use of agro informatics developments.

These peculiarities of farm structure reveal an ageing agriculture in Hungary that relies heavily on crop production.



RESEARCH APPROACH

The lack of knowledge greatly contributes to the absence of digitalisation (in the case of precision farming). In the case of young farmers, the price of the technology also hampers its use. A further concern could be the safe storage of data collected during the precision farming, which is a prerequisite for their successful use. The elimination of the problems related to data collection and storage could promote the penetration of precision farming and thereby contribute to increasing profits as well as decreasing

environmental impacts.

In summary, the economics of precision farming still represent progress since technologies and management techniques undergo continuous development. Digitalisation influences societal and institutional relationships, which demand and depend on digital technologies.

In rural areas, digital technologies can have both positive and negative social, economic and environmental effects. However, in Hungary the key factor that continues to affect the nature of precision farming is the lack of skilled workforce. It is also natural that raw material prices have a profound effect on profitability. Increased raw material prices, which impose greater expenses on farmers, can lead to delays or even to the non-realisation of major investments in new technologies (including precision farming). Two barriers are hindering the take-up of digitalisation in the region, therefore two research questions have been formulated around these two problems.

Questions:

- What factors affect the spread of precision technologies?
- What role does the spread of digitalisation play in the ability of rural areas to retain their workers?

Informally, one of the most frequently quoted arguments against the spread of precision technologies is that they are expensive. In contrast to this, the most recent national survey (KSH, 2021) revealed that the main reason for the lack of their spread is that farmers think they do not need them during production (75.3% of 123 thousand responses). Another main reason was that they did not have the necessary skills and knowledge (13.4%). In other words, the majority of the responses provided could be traced back to the lack of knowledge. The price of the technology was only the third factor, representing 5.4% of all responses.

The first question is based on the outcomes of the literature review, semi-structured

interviews and the opinions of the Living Lab participants.

The second question is based on informal discussions and results from the literature. The necessary qualification level of the actors working in Hungarian agriculture to do their work properly is low. During our informal discussions, these people also stressed that they could not consider technology development as long as they faced shortage of labour workforce even for the most basic operations. Here, we also have a case of lack of knowledge, which connects to the first question as well. In the case of agriculture, most research focuses on dropout rates. However, technological developments can lead to a shortage of skilled labour, as more advanced technologies require appropriate qualifications and special knowledge and skills.

SCENARIOS DEVELOPED

In the positive scenario (1), the agricultural workforce is able to acquire the right digital skills and keep pace with digitalisation developments. In the negative scenario (2), precision technology will remain costly, thus small-scale producers will not be able to reap its benefits.

In the first scenario, we assume that the lack of current digitalisation capabilities will decrease. As a result, farmers in the region will be able to reap the benefits of digitalisation. Nevertheless, the lack of digitalisation capabilities is extremely heterogeneous across businesses, making it difficult to develop targeted policies.

The low digitalisation of public services makes it even more difficult to adapt to the general digital environment. Currently, there is no IT vocational training in the region with a focus on agricultural economics. One of the main problems is the shift of age composition of producers towards older age groups, which hinders the spread of digitalisation. Older farmers are less open to digital solutions. As most farmers do not currently rely on the data they collect (or often do not collect data in sufficient detail), it is difficult to recognise

the benefits of a data economy. The spread of digitalisation is not supported by the size of the plant either. In addition, agricultural training institutions do not provide up-to-date practical knowledge, so farmers often have to reckon with a training period. An effective solution could be to integrate higher education, vocational training and the stakeholders of the value chain in order to increase the knowledge base. The agricultural enterprise provides practical experience, while higher education and vocational training help through continuous innovation and research experience.

The younger generation change may contribute more to the spread of digitalisation, but for many farms, the issue remains unclear.

The prevalence of precision instruments is currently low. There is a risk that many producers will not recognise the need for these tools, while some producers will not have the necessary expertise to operate the technology. A particular risk is that precision assets cannot be fully utilised since small-scale farmers have less financial capacities. One of the main problems right now is the lack of capital, which makes it very difficult for small-scale farmers to buy the technology. Furthermore, producers need to be provided with a long-term and stable legal and economic environment, as this is an important basis for the adaptation of precision technologies. It may be motivating to expand and redesign the support system and make open and free data available.





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POLICY IMPLICATIONS

Most criticisms made in connection with agricultural and agricultural sciences trainings in Hungary point to a lack of adequate training concept and the low prevalence of practical skills. From the point of view of users, learners, and students, this means that trainings, especially at higher qualification levels, are primarily theory-centred, with a relatively low ratio of elements of practical training. It is partly due to the training structure that the competitiveness of agriculture and the employability of the labour force can be regarded as unfavourable and the level of professional skills of the workforce in agriculture as low. The spread of precision technologies could be greatly improved if farmers would recognise the possibilities provided by precision technologies and be able to translate this knowledge into practice. However, there must be a close relationship between farmers' low qualification levels and their lack of necessary knowledge and skills on the one hand, and the fact that they fail to recognise the potential of technology on the other.

Creating a viable data economy

- Policy should incentivise data collection and processing by agricultural actors.
- Reducing the cost of accessing data.
- Supporting farms in collecting farm-level data, using farm management applications and making production decisions based on them.

Acquiring the necessary skills – personal development of the agricultural workforce

- Digital skills need to be developed and kept up to date.
- The link between theoretical training and practice should be strengthened.
- Higher education and value chain actors need to cooperate closely in order to develop a common knowledge base.
- Ensuring the functioning of digitalisation-focused advisory bodies and make it available to stakeholders.

Risk management and cooperation

- A digital ecosystem is needed where agricultural actors can adapt to take advantage of digitalisation.
- The benefits of precision farming need to be communicated to agricultural operators.
- Ensuring that small-scale farmers have access to precision tools and adapt the support and regulatory system accordingly.

Overall, thanks to the development of the agricultural workforce with continuous trainings, the **decrease of the rural population might cease. Updated information systems, educational programmes and trainings** offered by the national and local authorities, and at least partly supported by EU funds, are indispensable in that respect.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy-makers on how to support digitalisation in the context of Digitisation: Economic and Social Impacts in Rural Areas in the North Great Plain region, Hungary.

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Weed control in Swiss organic vegetable farming

The Swiss DESIRA Living Lab (LL) focuses on how digitalisation and the use of robots and other digital tools can support Swiss organic vegetable farming, with a particular focus on weed management. Weed control in organic vegetable farming encounter several challenges like the decreasing availability of manual workers. The future remains uncertain as to how weed control could be shaped by digitalisation.

To address this, the following scenario question was elaborated and discussed with stakeholders during workshops: **How will weeds be managed in Swiss organic vegetable farming in the increasingly digitalised age of 2031?**

As a result of two main scenarios developed with stakeholders, a positive and a negative one, five central policy options were elaborated: (1) Communicating about the advantages of digitalisation; (2) developing an environment that allows for more open innovation; (3) integrating digital specialists in teaching, consulting and agricultural journalism; (4) improving the economic conditions of digitalisation; and (5) encouraging a further diversification of rotations and agricultural activities.

CONTEXT

The Swiss DESIRA Living Lab (LL) focuses on how digitalisation and the use of robots and other digital tools can support Swiss organic farming, with a particular focus on weed management. In organic farming, weed control is a major issue and determines the yield potential of crops.

In 2019, vegetable production (open field) in Switzerland covered a surface of around 12'000ha. With 23% of the total vegetable production area, organic open-field vegetable production reaches a higher share than organic agriculture as a whole.

The vegetable market is well protected by tariffs limiting imports, particularly during the growing season of Swiss produce. The organic vegetable market, on a per capita consumption basis, is continuously growing, with a share of 23% of turnover of vegetable sales for organic in 2019. Policy and consumer demand push vegetable production to a higher sustainability level. A major challenge is that it becomes increasingly difficult to find sufficient workforce for the arduous work in vegetable farming.

Robots need to suit local conditions such as dealing with slopes, rocks, and heavy soils. They also need to be user-friendly and

economically efficient. In addition, it was identified that robot safety issues and data legal issues need to be clarified and secured, respectively.

Currently, no fully automated system is operating in Swiss vegetable production. Such weeding robots are currently in a testing phase.

What is already being used in practice, however, are camera- and GPS-controlled chopping modules that can be attached to and pulled by tractors. All relevant autonomous models for organic production are embedded with GPS and cameras, allowing the robot to move autonomously and precisely without human intervention. However, the robot's performance may strongly depend on natural parameters such as the presence of rocks.



Figure 1. Dino weeding robot (autonomous).
Source: www.naio-technologies.com.

RESEARCH APPROACH

The future remains uncertain as to how weed control might be shaped by digitalisation. To address this, a scenario question was elaborated with stakeholders (e.g. farmers, researchers) and discussed during workshops in terms of the practical implications.



LOOKING INTO THE FUTURE ALLOWS STAKEHOLDERS TO REFLECT ON LIKELY CHANGES, THUS FACILITATING THE ELABORATION OF STRATEGIES AND POLICIES ACCORDINGLY.

The question is as follows: **How will weeds be managed in Swiss organic vegetable farming in the increasingly digitalized age of 2031?**

Two workshops were conducted end of 2021 to address this question. The first workshop intended to select possible scenarios, whilst the second workshop intended to further develop the scenarios and discuss possible policy options that could either support or mitigate the scenarios. Here, we only focus on both a plausible positive and negative scenario.

SCENARIOS DEVELOPED

The positive scenario is called "Small is beautiful!" because it supports primarily the smaller farms. The negative scenario is named "Back to dairy industry" due to the relative decreased profitability of the vegetable sector.

In the positive scenario, the opinion of the society on robots will be significantly more positive. This will happen by making people aware that less pesticides will be needed when using robots for weed control.

People will also be more open to robots as it will become clear that digitalisation in agriculture brings advantages in other areas of life, e.g. in autonomous driving. This will influence farmers' decision to adopt robots as well as investments on the development and testing of robots. The robots developed will be small and more effective than today. The small size of the robots will make them easy to manipulate and more reliable than bigger robots.

In addition, there will be more qualified workers available, which will be useful to the tech sector and also help farmers to digitise weed control operations. At the same time, there will be a political pressure to further reduce the use of synthetic pesticides in the conventional sector, which may indirectly affect the organic sector. In fact, it could lead conventional farmers towards using (more) digital tools.

Furthermore, the legal terms regarding the use of digital tools will be clearer. This forecast was supported by the fact that the Swiss legislation is based and/or inspired from the legal situation that applies in the EU, which will likely become stricter. Then, robots will be more affordable, thus making investments in robots more profitable. Organic farmers will also benefit from the further development occurring in conventional production.

Moreover, both the selling prices and the market pressure for organic vegetables will remain stable.

Finally, weeds will be more resistant to pesticides, leading conventional farmers to look for alternative solutions. This could positively affect the organic sector.

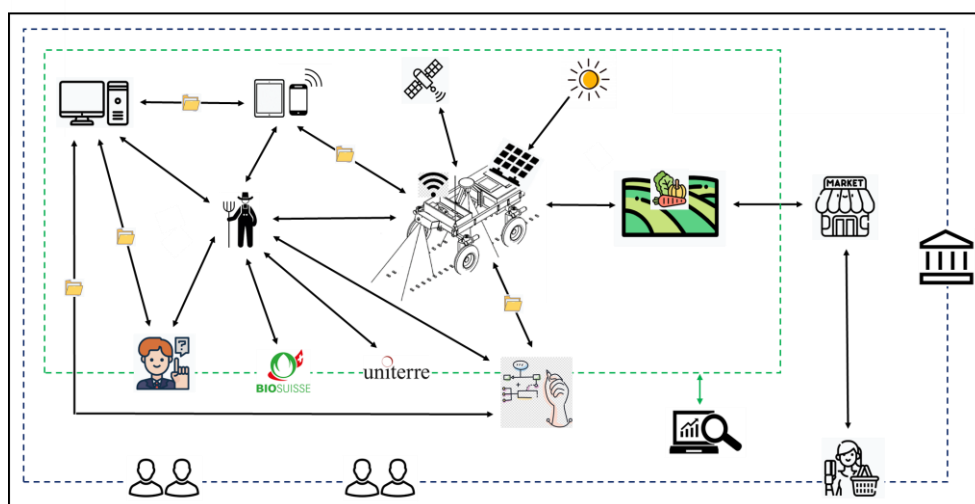


Figure 2. Visualisation of the digitised system related to the introduction of weeding robots³⁶

These changes will support the development of robots and digital tools as well as their adoption by farmers, especially for smaller ones as they suffer from a limited financial capacity.

In the negative scenario, fewer drivers of change were selected and discussed, as wished by the participants. In this scenario, there will be fewer qualified workers available in the future, which will make very difficult the further development of robots and other digital tools requiring specific skills. In addition, the ratio cost-efficiency/performance of digitised weed control will remain unchanged, meaning that investments by farmers, especially smaller ones, will still be an important barrier to adoption. Furthermore, the market pressure will increase, possibly due to a further liberalisation of the markets.

This scenario implies that robots and other digital tools used for weed control will not be further developed, making digitised weed control on a large scale impossible. It is also implied that the vegetable sector will be relatively less profitable and that farmers may return to (more) dairy production instead.

POLICY RELATED DISCUSSION

In the positive scenario, farmers will produce better quality products (due to fewer competition from weeds) using less manual labour, which will also increase their economic return. In addition, their work will be less tedious, among other positive impacts. These advantages should be better communicated to the farmer community and to the society as a whole.

That said, there will be a significant investment cost for farmers, especially smaller ones. One way to alleviate this problem is to share robots or other technologies between farmers. Another way is to favour the option of renting or leasing, in the same way as for cars. The farmers choosing this option will likely be smaller ones. At the same time, it will increase the dependency of those farmers. This problem should be further reflected by policy-makers and agricultural actors.

The issue of dependency also applies to the question of data protection. Farmers wish to

have data sovereignty i.e. that data remains with them. It was discussed that policies should foster the public debate on the issue of data protection and that policy related goals should be made clearer to all.

In addition, the hacking of digital tools could be disastrous. Devices must be secure to avoid this. Big robots will always have to be monitored. Furthermore, the technical development is uncertain because the conditions (weather, soil, etc.) can vary widely, which means that robots have to be very adaptable.

In the negative scenario, as the robots and other digital tools will not be performant enough, it will open opportunities for alternative innovations and combined processes (e.g. electricity, remote sensing, forecast models, etc). The potential for innovation in agriculture will thus be stimulated, which should be actively supported by public policies while taking account of the specific Swiss conditions (e.g. slopes, etc) that make it challenging for robots to operate in the fields.

This will also revive more traditional practices: Going back to the 'roots', the question will be: *"How can I mechanically control the weeds?"* In fact, this is an opportunity to gain knowledge or 'technical know-how' that vanished over the past decades due to the use of herbicides that does not require much of this knowledge. But answering this need will require to invest further in specialised training related to crop management.

Moreover, the market pressure may undermine the viability of the vegetable sector and will primarily affect smaller farmers. This will need to be mitigated. Stakeholders expressed the wish that price support mechanisms are maintained and they also mentioned that efficiency should be increased. At the same time, there will be an opportunity for an optimal allocated use of the landscape, thus increasing efficiency. It is also believed that this situation will lead to a certain specialisation "in niche", specialty and high-priced products. This will require developing policies that encourage diversification.



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POLICY OPTIONS

Communicating on the advantages of digitalisation

- Communicating to farmers and the society as a whole on the advantages of digitalisation in agriculture (e.g. fewer workers, higher domestic production due to gain in competitiveness, decreased use of pesticides, etc.).
- Making agriculture more visible to others in terms of digitalisation, including through advertisements.

Developing an environment that allows for more open innovation

- Promoting innovation further, especially in the area of technology; promoting innovations while taking account of the specific Swiss conditions (e.g. slopes, etc).
- Making (more public) issues related to data protection; encouraging public discussions on data protection and make clearer the related policy goals.
- Devices must be secure to avoid hacking; and the development of a legal framework would help in that respect.
- Reducing further the use of pesticides, e.g. by banning the most toxic ones and/or develop a specific tax system, thus encouraging innovative alternatives.

Integrating digital specialists in teaching, consulting and agricultural journalism

- Developing further training for optimised crop management for farmers.
- "Selling" the attractiveness of agricultural robotics, e.g. in the frame of training, internships, etc.

Improving economic conditions of digitalisation

- Reducing the economic burden on small farms, e.g. by encouraging robots contracting (renting, leasing) that would be particularly attractive for small businesses.
- Supporting an increase in efficiency to maintain Swiss competitiveness, e.g. through implementing subsidies for specific investments, including in the area of digitalisation.
- Supporting organic vegetable prices to maintain the viability of Swiss vegetable farms.

Encouraging a further diversification of rotations and agricultural activities

- Small businesses that do not want to digitise should orientate themselves differently (e.g. gastronomy, tourism, direct marketing, etc.).
- Promoting a further diversification of farms, e.g. with direct payments both to reach more diversified rotations and encourage 'extra activities' such as agrotourism.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy-makers on how to support digitalisation in the context of weed control on vegetable organic farms in Switzerland.

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Digital Services for Rural and Farmer Communities

This policy brief paper is based on a Living Lab formed within the scope of the EU DESIRA H2020 project and attempts to shed light on areas and aspects lacking adequate policy support. The mission of the Living Lab is to delve into the identification of digital services and functionalities in a group of farmers located in the rural area of the city of Katerini in central Greece and furtherly propose digital solutions and ways to implement them while minimising risks. For the purpose of this Living Lab, two future scenarios (one plausible positive and one plausible negative) were created based on a hypothetical scenario question related to the foreseeable future impacts of digital tools in the region's agricultural landscape and on farmers' income. The scenarios developed were used as basis on which a set of policy options are suggested taking into account the values, goals and specific traits of the Living Lab's 'ecosystem'. Policy interventions should focus on promoting support mechanisms and digital training programs for the farmer communities, establish public-private financial instruments to bolster the digital transition of agriculture at regional scale, and increase the transparency related to data handling, data ownership and rights.

CONTEXT

In terms of digital transformation, Greece lies well below the EU average and towards the bottom of the list of EU member states. The country's connectivity infrastructure and level of digital skills as well as the degree of digitalisation of businesses and public services score are among the weakest in the EU. However, Greece is making efforts to weather to a certain extent the Covid-19 after-effects with positive digital transformation actions that will contribute in the upgrade of the public sector, and facilitate the utilisation and further exploitation of the advantages of digital technology. On April 2021, Greece announced with the support of the European Commission the '*Greece 2.0, National Recovery and Resilience Plan*', which is expected to contribute significantly to the nation's digital transformation by devoting approximately 25% of its intended budget to digital objectives. When it comes to the rural and agricultural areas of the country, Greece is experiencing one of the highest digital skill gaps between city and rural area residents. However, with the global uptake of agricultural ICT technologies, Greece can leverage ICTs diffusion in its agricultural sector to further

spark a broader rural digital capacity uptake.

This policy brief is based on the '*Digital Services for Rural and Farmer Communities*' Living Lab that operates in Trilofos, a village and community belonging to the municipality of Katerini, located in Northern Greece. This region has a long tradition with tobacco cultivation, though in the recent years the position of the local farmers in the supply chain has weakened. The Living Lab delves to the identification of digital services and functionalities and proposes digital solutions and ways to implement them to a group of local farmers that are gradually transitioning from tobacco to leek cultivation. The introduction of digital solutions is forming new interactions among farmers and the agricultural land, and introduces new agricultural processes that enable new information sharing and decision-making routines, while at the same time reshaping the local market dynamics.



RESEARCH APPROACH

For the purpose of the Digital Services for Rural and Farmer Communities, the following focal question was discussed in the Living Lab (LL): **'How digital tools in the upcoming decade will impact the agricultural processes and the local economic development of Trilofos?'** This scenario question was adopted with the aim to create a future vision (ten year from now) and was presented as a baseline for the development of the future scenarios.



THE SCENARIOS DEVELOPED HAVE ALLOWED THE PROJECTION OF REALISTIC FUTURE OUTCOMES THAT REVEAL FOCAL AREAS THAT WOULD BENEFIT FROM POLICY INTERVENTIONS.

As a follow-up to the NEI (Needs, Expectations, Impacts) activities that led to the definition of an initial set of LL specific Drivers of Change, a further categorisation of the drivers took place that resulted in a new set of internal and external drivers based on their endogenous or exogenous impact on the LL's Socio-Cyber-Physical system (SCP). This refined set of drivers served as the basis of assumptions on which the participants of the workshop formulated the range of positive and negative future projections. Subsequently, each driver was transposed in its ten-year negative or positive future expression. The sum of plausible positive, Business as usual, plausible negative expressions of the drivers formed the probable range of future pathways that the future scenarios could follow. Through a series of team-based brainstorming and scenario building activities, the participants managed to formulate one positive and one negative future scenario based on the LL's scenario question.

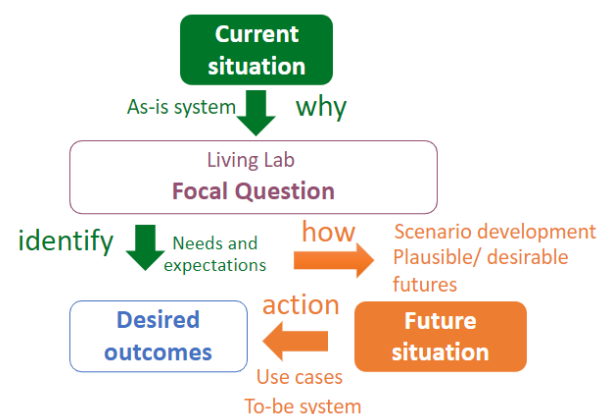
SCENARIOS DEVELOPED

One of the main goals of this Living Lab's activities was the sketching of two distinct future pathways. The creation of the pathways was based on the past LL developments that formed the general LL's socio-cyber-physical context as well as the

present needs and future expectations of the system and its actors. One positive and one negative pathway were outlined out of the range of identified future options, these two pathways served as the backbone on which the two future scenarios are based and as a reference point where the LL's SCP system strengths and weaknesses are projected.

The positive pathway revolves around a future where the farmer communities located in the region will be able to build on the existing digital development of the region and transition into a future where they would be able to upscale the digital infrastructure utilised and boost the overall capacity building of the region by increasing their digital skills and competences. This will attract younger individuals in the farming business, expand the infrastructure and services, reposition the local agricultural business in the agri-food value chains, foster an innovation culture in the region, increase their agricultural income, and ameliorate their working conditions.

The negative scenario revolves around a future where the transition to a digital future cannot be reached. The further development and adoption of ICTs is difficult either because of a lacking concrete business plan to support the provisions of digital services and infrastructure or because of the inability of: (1) the local communities to adapt to a digital agricultural environment, (2) create win-win collaborations with technology providers based on trust, or (3) foresee the added value of digital tools in their agricultural practices.



POLICY RELATED DISCUSSION

This Living Lab's future scenario development activities incorporated a multitude of actors, shaping a dynamic group of individuals coming from various backgrounds. Farmers, agronomists, agricultural extension services actors as well as agricultural technology providers contributed to the co-development of the future scenarios. The scenarios developed depict a form of an imaginary future carried out in a decade timespan with the purpose to capture how the identified strengths and opportunities as well as weaknesses and threats will evolve in the future and how they might affect the current stakeholders or create new unintended beneficiaries. The prevalent focal point that was brought up during initial discussions revolved around the local farmers' need to change their agricultural crops and methods to increase their income and break into new agro-food supply chains.

During the developmental phase of ICT adoption and digital uptake, the continuous support in the decision-making process and adequate training programmes are vital for the further development of digital skills of farmer communities to be able to meet the technical demands of digital agriculture and the market demands for providing the new agricultural products.



SUPPORT IN TERMS OF ADEQUATE TRAINING AS WELL AS TARGETED POLICIES TO ALLEVIATE MARKET ASYMMETRIES ARE VITAL FOR THE FACILITATION OF PRIVATE AGREEMENTS THAT WILL ENABLE FASTER AND LOCALISED DIGITAL UPTAKE.

While digitalisation has quickly brought noteworthy impacts in terms of agricultural efficiency, timely monitoring and risk mitigation, still, the farmers capabilities and skills to further exploit the agricultural data gathering is limited. Data processing and decision support are highlighted as primary factors that will allow the transition to a fully enabled digital agricultural system. Another important aspect highlighted relates to the high dependency of farmers from the technology/extension service providers. This fact closely relates to the limited digital skills and training of farmers to utilise the digital interventions applied. The establishment of mechanisms to convey knowledge and skills from the data curators and processors towards the end users - farmers - can lead to the capacity building developments that will in turn trigger a faster technology uptake from the farmers' communities operating in the region.

Furthermore, local stakeholders that form the HORECA sectors along with farmers/producers and food processors operating in the region are showing an increasing interest on how they can position their agricultural and food sectors to make the most out of the opportunities created from future digital advancements. Supporting the local value chain should not be solely a matter of individual value adding activities. Enabling policies targeted in agriculture that will not distort market decisions are also important for allowing value generation of agri-food and related sectors. The local producer's decision to move down in the value chain and upgrade their agricultural outlook or extend sales into the existing agri-food networks should be a subject of achieving a fitting policy mix in parallel with the introduction of digital agricultural methods.



This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

POLICY OPTIONS

Promoting training programmes and advisory support for farmers

- Connectivity, affordability, education on ICTs as well as supportive programmes that will enable the organised implementation of regional digital strategies are imperative to achieve the digital agricultural transition of the region.
- Deployment of targeted policies that will focus on providing incentives to the local community for inciting the adoption of digital technologies while providing supplementary educational programmes to increase the digital skills of the interested farmers.
- Policy actions need to set the foundation on which digital agriculture in rural areas will scale-up to increase the farm's productivity, boost the competitiveness of small farms and enable social inclusion through the modernisation of the agricultural sector.

Establishing public-private financial instruments that will allow a wider adoption of digital tools

- Widen the policy scope beyond direct EU and national payments, and provide incentives to the private sector with the prospect of creating profitable extension service, consulting and technology provision markets.
- Support the foundation of public-private partnerships at community level and facilitate complementarity between the provisions of the public and private sector to better address the needs of both farmers and rural communities. The private sector can provide more farmer-oriented delivery models in rural value chains that will in turn provide farmers with more choices.

Increasing transparency on agricultural data ownership and rights

- Design Policy frameworks with a clear focus on removing possible entry barriers that discourage the engagement of interested farmers with digital tools.
- Alleviate the asymmetries that arise between users and providers in ownership of digital infrastructure and data ownership, data management and data rights. Access and handling of information and data can lead to increased inherent value of digital ecosystems and new revenue streams.
- Design policies that treat data as an asset and ensure that data management is addressed in a clear, fair and non-discriminative manner while also ensuring the inclusion of private service providers, local actors as well as communities and public unions.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalization in the context of Digital Services for Rural and Farmer Communities in Trilofos Pieria's, Central Greece.

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Sustainable Water Management Practices

The Sustainable Water Management Living Lab (LL) operates in the region of Trikala in central Greece. So far, water scarcity has not been an issue for the majority of the rural areas of the prefecture. The amplitude of the region's water resources is sufficient for covering the agricultural and everyday needs of citizens. However, local authority representatives have realised that the current water management practices are sub-optimal and inadequate to ensure a mid-long term sustainable use of water resources for the region. Within the scope of this Living Lab, two future scenarios (one plausible positive and one plausible negative) were created based on a hypothetical scenario question related to the foreseeable future impact of digital tools in Trikala's water management routines. The two future scenarios created by the Living Lab's stakeholders during workshops have helped to identify various areas where future policies are needed. Deploying policies that will focus on alleviating the regions digital skill gap, promoting circular economy, 'localising' national and European policies and providing incentives to the local SME's are key factors when trying to implement sustainable management practices that rely on public participation, usage and adoption of digital solutions.

CONTEXT

Greece has realised the necessity of its transition to the digital economy and society. The digital transformation is an immediate need and priority in Greece.

In this context, a national strategy was developed for digital transformation aiming to align with landmark digital European policies and set specific targets that will benefit the Greek society and economy. Greece faces long-lasting structural deficiencies as well as social and demographic peculiarities that impede the fast-paced implementation of digital transformation policies and initiatives, facts that are also reflected in the country's significantly low rankings among the EU member states based on the Digital Economy and Society Index (DESI) and the Network Readiness Index (NRI). When it comes to rural and agricultural levels of digitalisation, Greece is making efforts to close the gap with the rest of the European states by implementing national scale horizontal measures. However, further focus should be directed towards individual challenges that the rural regions face, where mechanisms enabling the exploitation and channelling of the local experience and tacit knowledge into the

policy making process are still missing.

This policy brief is based on the Sustainable Water Management Living Lab (LL) that focuses on water management practices for the region of Trikala. The amplitude of water resources in the region is sufficient to cover the agricultural and everyday needs of citizens. However, local authority representatives have realised that the current water management practices are inadequate to ensure a mid-long term sustainable use of water resources for the region. The most pressing issues identified inside the scope of this Living Lab are the high fragmentation of roles responsibilities among various water management and public agencies and the lack of an integrated regional plan when it comes to water management (also hindered from a lacklustre regional/national water regulatory framework). Moreover, it was observed a low level of public awareness when it comes to sustainable water management practices. The LL activities have contributed in steering local stakeholders and public administration in prioritising future activities for the adoption of digital tools and strengthening the administrative coordination as well as raising public awareness when it comes to sustainable water management practices.

RESEARCH APPROACH

As a starting point the scenario development activities of this Living Lab (LL) used the following focal question **'How can digital tools impact the management of water resources in relation to Trikala's farming rural & city needs in the next decade?'**. This scenario question was adopted with the aim to create a future vision and was presented to the Living Lab's stakeholders as a baseline for the development of the possible future scenarios. Through a process of assessing the past needs, expectations, and impacts (NEI), the LL participants have contributed to the development of the two future scenarios.

A follow-up to the NEI activities was the definition of an initial set of LL Drivers of Change (DOCs). The validation and refinement of the DOCs took place in a workshop with the contribution of key LL stakeholders. The refined DOCs served as the basis on which the workshop's participants formulated positive and negative future visions of the region. The plausible positive, business as usual, plausible negative expressions of these drivers constituted the range of future pathways that the future scenarios could follow.



CREATING SCENARIOS TAKES THE FORM OF AN IMAGINATIVE ASSESSMENT CARRIED OUT INTO A POSSIBLE FUTURE WHERE DIGITAL IMPACTS HAVE RESHAPED THE SOCIAL, PHYSICAL, AND TECHNOLOGICAL ENTITY INTERACTIONS FROM THE LOCAL STAKEHOLDER'S PERSPECTIVE.

SCENARIOS DEVELOPED

One of the main goals of the Living Lab was the creation of two complete future pathways using as a point of reference the past (NEI) LL activities that contributed to sketching the wider LL socio-cyber-physical context as well as the current needs and future expectations. The output obtained was a positive and a negative pathway that were used as the better (positive) and worse (negative) case scenarios and served as a baseline where the LL's Socio-Cyber-

Physical system strengths and deficiencies as well as threats and opportunities are projected.

The positive pathway revolves around a future where a family takes the decision to relocate from Athens in the Trikala region, planning to utilise the land in their possession and get involved in the agricultural business. The irrigation of their land is a major concern both in terms of quantity of water, but also of the related costs. Their introduction into the Trikala's rural environment and the initiation of their agricultural activities are facilitated by the digital developments being introduced in the region and that have been gradually built during the last two decades. ICT tools and infrastructure have provided a significant boost to the digital capacity of the region, strengthened the public inclusion mechanisms in the decision-making process at local level, and enabled new crucial services to the local farmers, citizens and business, speeding up the Smart Transformation process of the Trikala region.

The negative scenario revolves around a future where a digital future in Trikala is reached to a high degree. However, digitalisation and the Smart evolution of the region have shaped negative externalities for the society and agriculture in the region. The scenario is narrated through the eyes of a young farmer who relocated to the rural region of Trikala in 2027 opting to start a new cultivation and facing the first negative impacts of digitalisation when the regional authorities plan the further adoption of digital solutions for resource management and more specifically on water usage. The diversified demographic profile in the region, in conjunction with the inability of public authorities to deploy an integrated digital transformation plan, forms a significant obstacle for the further adoption of ICTs to promote sustainable practices. This ultimately leads to a dysfunctional Smart transformation that does not promote inclusion, transparency, and the focused adoption of digital solution serving the water management needs and sustainability of the region.

POLICY RELATED DISCUSSION

For the development of the Living Lab's future scenarios, a cross-section of actors was invited to contribute. They were coming from the fields of policy-making, research and innovation, farming, agronomy as well as Trikala's public administration agencies. The scenarios developed depict a form of an imaginary future assessment carried out in a decade's timespan with the purpose to capture how the identified strengths and opportunities as well as weaknesses and threats will evolve in the future and how they might affect the current stakeholders or create new unintended beneficiaries. The prevalent focal point that was brought up during initial discussions revolved around the lack of centralised water management planning and lacklustre collaboration among the municipal administrative agencies as well as the lacking data gathering and management that could enable a well-informed decision-making process on future actions.

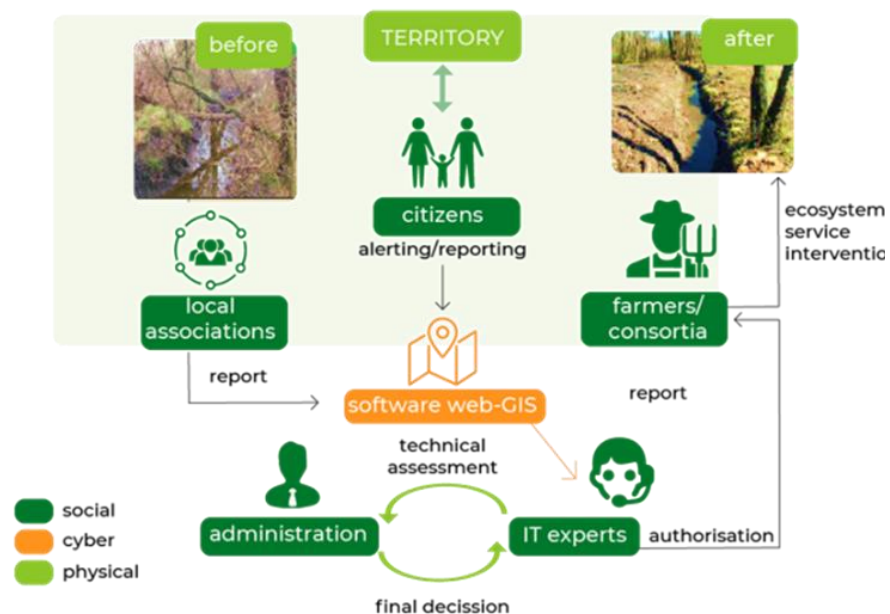


DEFINING WATER NEEDS AND WATER USAGE HABITS WHILE CONSIDERING THE DEMOGRAPHIC SPECIFICITIES, SKILLS AND CAPABILITIES OF THE COMMUNITIES LIVING IN THE REGION OF TRIKALA, IS CRITICAL FOR DEPLOYING POLICY INTERVENTIONS THAT WILL ENABLE THE INTEGRATION OF SUSTAINABLE WATER MANAGEMENT INTO THE TRIKALA'S SMART DIGITAL TRANSITION.

Since the region is on track with 'Smart Transition' the future implementation of digital solutions and adoption of new tools and services can be perceived as realistic targets for Trikala's future.

However, there is a significant discrepancy in the pace at which digital transition is realised within the city of Trikala in comparison to rural areas of the region. Considering the significant digital skills gap that exists between the population in the urban and rural areas, the establishment of new tools and protocols remains a real challenge.

The different future conditions depicted in the scenarios developed indicate that Trikala's future planning must widen its scope and go beyond the sole adoption of digital tools, services, or establishment of 5G networks. The existing developments towards Trikala's digitalisation transition and smart city actions were used as the baseline on which a set of plausible futures were described. In both the pessimistic or optimistic turn of events, the main objective/challenge that 'makes' or 'brakes' the region's success in establishing sustainable water management practices and in larger scale (maintaining an actual-meaningful Smart transition course of action), is the planning of capacity building interventions tailored to the region's different communities and demographic profiles.





This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

POLICY OPTIONS

Promoting Digital Literacy and developing Digital Skills

- Deploy horizontal actions, focused on alleviating the low levels of digital literacy in the rural areas of Trikala.
- Promote a wide uptake of public training programmes in the form of lifelong learning programmes, vocational training programmes as well as school and university education programmes will play a pivotal role in having the necessary capacity to implement new standards for sustainable water management and smart agriculture.

Steering Smart Transition towards Sustainable water management practices

- Shape a common course of action between the stakeholders and beneficiaries involved in the regions water management, building also on Trikala's smart and digital transition roadmaps to address enabling conditions for targeted innovation actions at a regional scale.
- Plan of Targeted actions that will contribute in the facilitation of existing water policies such as the 2nd River MPB (set measures for the protection of aquatic environment and safeguard sustainable water use) promotion of licensing of water included in CAP 2014-2020, enforcement of environmental tax of water status ratified in RDP 2014-2020, and further adoption of smart monitoring mechanisms.

Promoting Circular Economy

- Emphasise on future waste management actions to enable the transition towards a circular economy.
- Adopt measures to gradually ban single use plastics, while fine tuning the smart city actions to align with the new measures to achieve the targets of increasing reuse and recycling rates of municipal solid waste and reducing the landfill rate by 2030.
- Provide incentives in the form of financial mechanisms and training programmes to attract investments and upgrade local SMEs in a way that will accelerate the regions green and digital transition.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalization in the context of Sustainable Water Management Practices in Trikala, Central Greece.

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Reviving the rural areas 2030

DigiFarmTour Living Lab

The goal of the Croatian Living Lab, located in the Croatian Adriatic Region, is to explore possible connections between small sustainable farmers, tourists and consumers. The first objective is to find an appropriate way to create the political and infrastructural means for sustainable rural living. With current trends, a great number of villages and farms will be increasingly “deserted” until 2030, calling for solutions.

Advancements of agriculture and the overall digitalisation of government and society will enable the needed infrastructure for the development of commerce and direct sales of agricultural products. Main identified challenges in the process of reviving rural areas are socially and technologically related. Enabling of a decent life in rural areas with a “civilisation infrastructure” proper health care for all age groups, education, government facilities and e-government are key factors.

CONTEXT

The current status of digitalisation in Croatia is mediocre. In terms of digital skills, the younger generation in Croatia (16-34 years old) performs significantly better than the EU-27. The share of farmers in younger age groups (up to 40 years) in Croatia is relatively low (around 12% of farmers), so it can be assumed that the total number of people with good digital skills is low. Other age groups that perform below the EU-27 average in terms of digital skills represent the largest part of the sector and the economy in general.

While Croatia has a good fast broadband coverage (86% nationally and 39% in rural areas), its overall fixed broadband take-up is slightly below the EU average. One of the positive developments in connectivity is the assignment of harmonised spectrum for 5G in August 2021.

Digitalisation of services and availability of modern broadband infrastructure is satisfactory in urban areas and several service providers exist on the market. Prices for the services are higher than the EU average and, in some cases, more expensive in relative costs of life.

Experts from interested sectors, in this case agriculture, tourism and information technology have come together to the DigiFarmTour Living Lab. It was proven

that the use of digital technologies in the form of interactive web applications opens new opportunities for farmers to promote and directly sell their own agricultural products. The context of connecting the agricultural and tourism sectors is the main topic of the Croatian Living Lab (LL). Key issues defined in the LL are the lack of knowledge in the use of digital technologies as well as the uneven coverage of the Internet in rural areas. Although national strategies and policies regarding digitalisation put into force after 2013 identified this problem and planned appropriate interventions, their implementation was unsuccessful. The lack of human resources and skills needed for the use of public funds through open calls for infrastructure investments resulted in slow spread of broadband coverage, especially ultra-high-speed internet.

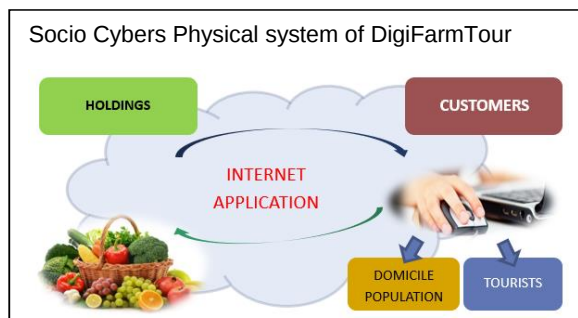
Legal framework for continuous progress in the overall digitalisation context is defined (or about to be defined) and it is expected that the overall digitalisation of Croatian society increases and improvement in development of digital infrastructure and skills is to be expected.

RESEARCH APPROACH

The Croatian Living Lab focuses on the role of digitalisation in making sales of local products easier to the tourism sector using advances in digitalisation of the society.



DIGITAL TECHNOLOGIES ARE THE DRIVERS OF CHANGE FOR ALL SECTORS AND ESPECIALLY FOR THE DIRECT SALES OF AGRICULTURAL PRODUCTS.



The main focus question was **"How digital technologies will improve the promotion and sale of local agricultural products in the tourism market by 2031?"**.

Discussion during the workshops encompassed all factors influencing the LL: The expected future agricultural production (olives and oil production), future of commerce (evolution of online shops), tourism, as well as social aspects of life.

Agriculture production in the region is characterised by pastures and meadows (57%), arable land (21%), olive orchards (10%) and vineyards (5.5%). Average farm size is in the Adriatic region small (1.1 ha). Tourism, with a share of around 20% of the GDP (national richness), is the most important economic activity in this region. Therefore, a comprehensive approach to the development of this region is not possible without connecting agriculture and tourism.

The global market is saturated with cheap mass-produced agricultural products, often an insufficiently known method of cultivation. Local and authentic food becomes an important factor of tourist attractiveness of the location. One solution in such a situation is the direct sale of own agricultural products. The use of digital technologies in the form of a specialised,

interactive web application opens new opportunities for farmers to promote and directly sell their own agricultural products. Small farms thus get a quality-marketing tool for direct communication with end customers.

SCENARIOS DEVELOPED

Two main scenarios were developed: The "Digitally coloured rural life (DCRL)" and the "Elite, local, ecological, digital tools (ELEDA)".

Digitally coloured rural life (DCRL)

In the case of DCRL, a young couple decides to change their lifestyle and to replace the urban environment with a rural one. Good conditions and various incentives give them the courage to decide living in the countryside. The idea is to make a living from the products they produce on their own land. The source of income through diversification of their farm within a good economic and political situation offers them security and promises a high standard.

Immediately after arriving and realising that their knowledge is not sufficient, practical as well as theoretical about life in rural areas and food production, they seek some advice and apply to the local agriculture advisory service that is free and offer tailor made advice based on their needs. As part of the advisory package, they receive all relevant information from the production and processing of their own products to the registration of tourism and hospitality technical and legislative activities. As part of the advisory service, they found a partner who will work with them to solve all the challenges they face and also get in touch with other producers with similar problems. Thanks to all that they have more courage and feel like a part of a community and certain safe net in 2031. The Croatian Adriatic coast is known as one of the safest places in the Mediterranean, and with the help of an application that offers tourists all the necessary information, it has established itself as a place of elite tourism.

The products of rural farms are in high demand and relatively expensive and can only be afforded by a certain number of people due to limited production. Producers of agricultural, food products and providers of various services on farms in rural areas are connected in a network of digital services that allows them access to specific information, services (e.g. harvests machines, production robots, distribution with cargo drones etc.) and contacts of all relevant factors of agri-rural-tourism sector.

Such families have the security and desire to raise their children in a well-organized rural area. The second generation no longer has pioneering problems like their parents and can dedicate themselves to raising the quality of work and life.

Thus, we have successfully revived the rural area, preserved the culture and heritage of the rural areas and ensured a better quality of life for its inhabitants. Rural life is no longer stigmatized as less valuable and people in rural areas do not feel isolated or unappreciated because of their way of life but instead see their way of life more meaningful and fulfilled than in urban and suburban centres.

Elite, local, ecological, digital tools (ELEDA)

With the implementation of a new law that allows all EU citizens to buy land in the Republic of Croatia come large companies but also a number of small producers looking for fertile healthy land for agricultural production. Due to the war and other socio-political factors, a large part of the Croatian agricultural land has been uncultivated for over 30 years, where the production of high-quality organic products is possible.

Thus, in addition to food production, new farmers returning to life in rural areas see their opportunity to earn money through some form of agri-tourism. Most people who decide to move to rural area and engage in agriculture are not so skilled in agriculture and need advice and knowledge. The question is how much they will be able to get the requested

information from various advisors or consultants and how much it will cost them. The Covid pandemic has left its mark on tourism sector. Tourists are now looking for smaller places with an indigenous experience, which brings various providers of tourist and catering services to rural areas. In the absence of a comprehensive development strategy in the agri-rural-tourism sector, exclusively tourism companies are coming to rural areas along with farmers, wanting to take advantage of the trend in tourism. Professional tourist companies are unfair competition for farmers who also want to host tourists and offer them an indigenous experience of life in a rural area, and offer products of their own economy and on-site production.

Such exclusively tourism systems do not develop life and do not revive rural areas and their heritage, but only work during the tourist season and are closed the rest of the year (becoming "dead" again). Basically, there are all the prerequisites for the formation of a tourism network of food production and revitalisation of rural areas but all these individual parts are not connected meaningfully through a common strategy.

Local economy does not benefit much from such tourism as we could see now that due to Covid these areas have missed two tourist seasons; yesterday's lively tourist places collapsed like "towers of cards", leaving people in severe poverty.

The danger in absence of a comprehensive rural development strategy is that these rural areas do not exist without tourism.

With the arrival of foreign and domestic companies but also individuals in rural areas that have been abandoned so far, villages and life in them are revived. People of various backgrounds are trying to create communities where they will form a rural idyllic life.

Due to health-socio-political insecurity they cannot achieve the desired standard and feel deprived towards people in urban areas. The second generation is thinking about leaving the rural environment and does not feel proud or special because they are engaged in agriculture and live a rural life.

During the workshops, several key challenges were identified. They can be divided into categories of agriculture, commerce and social challenges. With advancements in agriculture and increasing of digitalisation and automation it is expected that in 2031 a small family farm can be sustainable and live a decent living. The risk of market fluctuations having devastating effects on the producers. Because of relatively low incomes for people living in Croatia, the target population for such products are the tourists (either through individual tourist routes or through the catering and hotels). Before the COVID-19 crisis, almost 19 million tourists visited Croatia annually, mostly in the region of the LL. Overall, digitalisation will enable transformation of sales of agriculture products and probably enable cheap enough delivery options. In addition, the motivation of the young generation to live in rural areas is increasing.

Differences in successfully overcoming these challenges guide possible scenarios. If the government and the society manage to find the right policies that will enable progress and create a positive climate, the situation will be like 'rural idyll'. If not, depression and further breaking-up of villages and rural areas will be inevitable.

POLICY RELATED DISCUSSION

The Croatian economy is very dependent on the tourism representing around 20% of the GDP. Main occupation and source of income in rural areas is agriculture. Current active government strategies for agriculture are focused on the transition of agriculture to profitable and technologically advanced agricultural production (vegetable production, fruit, olive, grape/wine), the diversification of the family farms, as well as the highest possible level of products processed on-farm. Digitalisation of the government and economy is also increasing and was further accelerated by COVID-19 and the resulting pandemic measures.

Legislation regarding on-line shopping also adapts as quickly as possible.

Crucial impacts in rural areas will be the implementation of social and demographic policies with the aim to incite young people (families) to return to rural areas and start a business / modern farm.

The lack of a clear policy and economic strategy for rural development does not offer them any financial or advisory assistance in solving problems.

Climate change has made severe weather events very common and the production is unstable and unreliable. To be a successful producer, the farmer need to use all available technologies (irrigation, frost protection nets, frost hunters, etc.) but they are very expensive and unaffordable to most of them. Market is very demanding and only want 'perfect products' and product availability throughout the year. Farmers' income is low as the machines and production costs are very expensive, division between rich and successful and poor, urban and rural is significant.

The main challenge is how to assure all the necessary civilisation achievements that one expects in the 21st century (health care, education for the children, culture) in the rural areas that are depopulated and distant from the cities and basic infrastructure (e.g. hospitals).

Mutual approach of agriculture, commerce and social (health, education, culture, etc.) policies to enable descent life of agricultural producers in rural areas is crucial for the survival of Croatian rural areas. Descent living is not about money but related to the quality of life.



This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

POLICY OPTIONS

Croatian Recovery and Resilience Plan

The Croatian plan, which involves a total investment of approx. EUR 6.3 billion, includes digital investments of a total of EUR 1,285 billion (20.4% of the plan's budget). It is structured around five priorities: (i) the economy; (ii) public administration, the judiciary and the State; (iii) education, science and research; (iv) labour market and social security; and (v) healthcare.

- Digital transition investments with a total of EUR 576 million.
- Public administration investments of EUR 437 million.
- Education, science and research component investment of EUR 158 million.
- Labour market and social component investment of EUR 57 million.

All those priorities are and must be equally represented because they act as a chain. Therefore all legislative in different sectors should be synchronized.

Organic legislative

- Following the National Rural Development Plan 2023 – 2027 adopting national strategy and action plan for organic agriculture and production of organic agricultural and food products.

Law on State Information Infrastructure

- Development of e-public administration following the European guidelines commissions and the development of e-services, e-services for citizens and e-services for business entities.

National Digital Agenda

- Following the National Plan for Broadband Development 2021-2027 and 5G implementation adopting a policy framework for the inclusion of autonomous and smart machines in the agro-production cycle.

Transformation of the advisory service and integration with socioeconomic topics

- Quality education available to everybody under equal conditions considering lifelong learning principles.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalisation in the context of DigiFarmTour in the Adriatic region of Croatia.

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Digitalisation and wood-energy traceability in Italy

This brief presents the work of our Living Lab (LL) carried out in order to answer the question *"How will digitalisation transform traceability in the Italian forestry and wood-energy sectors by 2031?"*

Within this frame, our LL identified two main scenario narratives based on two so-called "intermediate scenarios", meaning a "better but not best" scenario named **"Digitalised and transparent forestry-wood-energy supply chains: a path towards a sustainable forest bioeconomy"** and a "worse but not worst" scenario named **"Digitalisation for traceability in the forestry-wood-energy sector: a postponed chance"**.

Four specific policy options have been fine-tuned, and are described in this document: promoting and funding initiatives for collaboration and cooperation between forest owners and forest companies; supporting the request and consumption of national wood; fostering digital innovation for mountain areas; enhancing attractiveness mountain and forestry areas.

CONTEXT

Illegal logging significantly damages both the legal market and public treasury, encouraging tax evasion and creating opportunities for money laundering.

Every year in Italy (which is the first importer of firewood worldwide), tons of timber without a clear traceability are imported. In order to foster production of wood from legal sources, the EU has enacted the European Timber Regulation (EUTR – Reg. n. 995/2010), minimising the risk of illegal timber being placed on the European market. The EUTR imposes European economic operators to exercise "due diligence". This latter implies the provision of specific and reliable information on timber supply. Such a mechanism strongly relies on data flows allowing both assessment of risk and introduction of measures for risk mitigation. This procedure is currently mainly based on a so-called "paper-based approach", since traceability verification strongly (if not only) relies on documents (desk audit) while the application of digital solutions still lags behind. Against this background, the main existing needs identified by our Living Lab (LL) can be summarised as follows:

1. Increasing transparency in the forestry sector;
2. Pushing the demand for legal and sustainable forestry products;
3. Enhancing the access to easy-to-use and affordable technologies for timber traceability;
4. Fostering participatory forest planning and supply chain organisation;
5. Boosting digital education and lifelong training for companies' managers and employers.



RESEARCH APPROACH

The objective was to explore possible evolutions in the next decade of the sector under investigation, with particular attention to the digital transformation, providing ideas and stimulus for stakeholders and policy-makers.

The LL carried out the following main activities during two remote scenario workshops held in September and October 2021: i) Definition of a scenario question; ii) elaboration of scenario narratives; iii) definition of drivers of change; and iv) identification of plausible future pathways.



THE LIVING LAB DEVELOPED SCENARIOS BY QUESTIONING HOW DIGITALISATION WILL TRANSFORM TRACEABILITY IN THE FORESTRY SECTOR IN 10 YEARS.

First, our LL participants agreed upon the following finalised version of the scenario question: **how will digitalisation transform traceability in the Italian forestry and wood-energy sectors by 2031?** Accordingly, an open and participatory forecasting exercise was carried out in order to answer this question. LL participants were able to identify two main (intermediate) scenarios characterised by different and plausible evolutions of socio-economic, environmental, political and technological drivers. Then, two extreme scenarios (evoking “utopian” and “dystopian” situations) were also depicted.

SCENARIOS DEVELOPED

LL’s participants were asked to elaborate scenario narratives based on two intermediate scenarios, a “better not best” (BnB) scenario (named “**Digitalised and transparent forestry-wood-energy supply chains: a path towards a sustainable forest bioeconomy**”) and a “worse not worst” (WnW) scenario (named “**Digitalisation for traceability in the forestry-wood-energy sector: a postponed chance**”).



In the BnB scenario, winners will certainly be companies able to take advantage of clean energy sources (such as forests) in mountain areas. Young generations also will act as proponents of a transformation towards a sustainable forest bioeconomy. In the BnB scenario, the use of tracked forest resources for energy purposes will generate greater **added value along local energy supply chain** and it will positively contribute to a better image of internal areas and to promote tourism. Furthermore, digital transition will contribute also to increasing the **attractiveness of rural areas for workers and families from urban areas**. In the WnW scenario, winners will be those companies operating illegally and big organisations able to overcome small companies in the forest sector. In this scenario a key uncertainty will relate to **pressures and requests coming from civil society** (mainly people living in urban areas, not always with in-depth technical knowledge and free from prejudices on the use of wood for energy purposes) that might end to indirectly support fossil fuels and nuclear energy and discourage production of biomass for energy purposes as well as import and consumption for quality-air issues. Moreover, in this scenario there is **no structured supply chain** at all. This is due to a de-industrialization of the sector which leads to less availability of residues which are valorised in the energy supply chain. In this regard, a key uncertainty relates to the real ability of forestry companies to reorganize themselves and better coordinate their activities and decisions by networking and cooperating.

POLICY RELATED DISCUSSION

During the LL activities, participants were encouraged to identify policies and programs on the basis of the following questions: "if we want to benefit from plausible future opportunities, or alternatively, to mitigate risks that the future may hold, what actions must be taken?"

At a later stage, LL participants considered whether the policies and ideas from the BnB scenario would be effective within the WnW scenario and vice versa.

As a result of this debate, we selected policy options potentially effective for both scenarios.

First of all, we selected policies able to **promote and fund initiatives for collaboration and cooperation between forest owners and forest companies, since they** would be able to boost opportunities in the BnB and to mitigate risks in the WnW scenario.

In fact, LL participants suggested to support the creation of business networks, logistic platforms and platforms for wood exchanges. In both positive and negative scenarios, this kind of policy could contribute to reinforcing the coordination among actors along the supply chain of forestry products.

Other key policies are linked to the capacity of **supporting the request and consumption of local wood**. In this regard, lowering the VAT on all forest products, may contribute to the increasing possibilities for business and work opportunities in mountain areas. Moreover, supporting the creation of an "Italian wood" trademark to better communicate and promote the role of local and certified wood and creating a system of Green procurement may be a good strategy on both scenarios.

Furthermore, **increasing attractiveness mountain and forestry areas** is seen as a policy able both to boost positive aspects in a BnB scenario and to mitigate negative aspects in a WnW scenario. In general, such a policy is seen as an opportunity to

attract people (young in particular) in internal and marginal areas.

In this regard, one of the main challenges in both scenarios is to stop the brain drain from inland and mountain areas to the urban areas, offering work and training opportunities and those who decide to live in inland areas.



CO-DESIGN ACTIONS TO IMPROVE DIGITAL SKILLS IN THE ITALIAN FORESTRY SECTOR IS A KEY POLICY PRIORITY.

Last but not least, **increasing digital innovation and competencies in mountain areas** may positively contribute in the development of both scenarios. With this regard, it has to be recognised the crucial role of digital skills and the need of co-designing with local stakeholders' related services and actions.

In a BnB scenario, digital education and long-life training of operators represent fundamental challenges milestone also in order to protect users' privacy. Indeed, there is no chance for digital security without digital literacy, because "the person is the first means to protect privacy".

In a WnW scenario, the introduction of innovations already consolidated and widely used in other contexts could bring some advantages. In this regard, it is strategic to enhance the ability to transfer those technologies and solutions already available and consolidated in other sectors and to adapt them to the forestry sector.



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POLICY OPTIONS

Promoting and funding initiatives for collaboration and cooperation between forest owners and forest companies

- Supporting the creation of business networks, logistic platforms for wood exchanges that could contribute to fill the coordination gap among actors along the supply chain of forestry products, fostering the use of cascading wood and traceability.

Supporting the demand and consumption of local wood

- Lowering the VAT on all forest products, since they store CO₂ and are already an "antidote" to the climate crisis. Furthermore, it should be recognised that the storage of CO₂ in these products is also beneficial for the territories from which the wood was taken and used.
- Supporting the creation of an "Italian wood" trademark to better communicate and promote the role of local and certified wood.
- Supporting the application of digital systems for wood-for-energy traceability.
- Creating a system of Green procurement to boost local wood production.

Increasing mountain and forestry areas attractiveness

- Investing on public welfare, acting on school, transport, social welfare and heavy services in inner and mountain areas.
- Supporting the start-up and growth of "community cooperatives", such as "energy communities".
- Introducing subsidised mortgage and tax reduction for inner and mountain areas inhabitants.

Increasing digital innovation and competences in mountain areas

- Improving digital skills and competences of local stakeholders and co-design of new services and actions.
- Facilitating access to intermediaries, digitalisation brokers, boosting opportunities to support digitalisation.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalisation in the context of wood energy traceability in Italy.

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Digitalisation of ordinary land management in rural areas with mountain landscape

This policy brief presents the discussion of the Living Lab Toscana Nord on the use of digitalisation to prevent hydrogeological risk. The main idea is that digitalisation can facilitate the information flow from the field to the decision makers, involving different actors and tools in order to identify the need for maintenance works.

Within this frame, the LL identified two main alternative scenario narratives based on a different level of interaction between people and technologies. During the workshop the participants identified the scenario with higher participation of local communities as the preferred one for the Consorzio Toscana Nord.

As a result of the two main scenarios developed with stakeholders, four central policy options were elaborated: (1) to promote the involvement of local communities in public service delivery in rural areas with mountain landscape; (2) support farmers' income; (3) promote the involvement of local communities in the technology design process; (4) increase broadband coverage as well as connectivity and digital skills of local communities and public administrations.

CONTEXT

The hydrogeological risk is increasing due to climatic change and land abandonment. Erosion phenomena due to extreme weather events can generate floods and landslides. The ordinary land management, focusing on constant maintenance works on the drainage network represents an efficient solution to reduce the risk.

Ordinary land management is the activity of constantly monitoring of land and water streams, identification of sites where maintenance works are needed and the organisation of such maintenance works.

The maintenance of the main hydrographic system is under the responsibility of public institutions. However, the division of tasks and roles among different institutions is not always clear, especially in rural areas with mountain landscape where there are several issues of accessibility and communication among overlapping institutions. In the area identified for the present Living Lab (LL) in the North of Toscana the competences for managing the maintenance works on the drainage network are of the Reclamation Consortium (Consorzio Toscana Nord), as defined with the Regional Law 79/2012. The area managed by the Consorzio Toscana Nord cover more than 360.000 ha including

rural areas with both plain and mountain landscape. A constant monitoring of the drainage network in rural areas with mountain landscape is difficult, due to isolation and complexity of the environment.



Figure 1. Example of maintenance work

The Consorzio Toscana Nord recognise the experience of local farmers and their role for ordinary land management. They consider important the active role of farmers in the alert system and in the small-scale maintenance work as they 'live on the land' and have a continuous observation perspective, not related to single periodical on-site inspections.

The main required activities that emerged in this context are:

- To deploy better solutions **to facilitate the coordination of monitoring and prevention** of the hydrogeological risk;
- To identify the needs of stakeholders to **develop suitable and effective digital tools for environmental monitoring.**

RESEARCH APPROACH

The research work started in the first year of the DESIRA project focusing on the way digital technologies are currently used and which are the needs of local stakeholders. This work, represented a starting point to explore the future of digitalization in the process of ordinary land management in 2 workshops involving the participants to the Living Lab.

The Living Lab Toscana Nord defined the following scenario question: **“How will the ordinary land management in rural areas with mountain landscape of the Reclamation Consortium “Toscana Nord” be managed in 2031? What role will digital technologies play in this process?”**

A first online workshop was conducted in September 2021 with key informants from the LL to develop the first draft of possible future scenarios based on the identified drivers of change. End of October 2021, a face-to-face workshop was then organised by involving local actors of the LL (e.g. Local farmers, municipalities, technical staff of Consorzio Toscana Nord etc.) to discuss the two main scenarios drafted and define specific details and narratives.



THE LIVING LAB DEVELOPED POSSIBLE FUTURE SCENARIOS BY CONSIDERING DIFFERENT LEVELS OF INTERACTIONS BETWEEN HUMANS AND TECHNOLOGIES.

Four possible scenarios developed by the key informants in the first online workshop were presented to stakeholders at the beginning of the second workshop. The LL participants identified the preferred scenario as the one with higher interaction between technology and people as opposed to the one that assumes an absence of investments on digitalisation in ordinary land management (Called business as usual). However, the two options discussed in the workshop were the technology intensive scenario and the human intensive one (figure 2).

SCENARIOS DEVELOPED

The LL participants were asked to elaborate scenario narratives based on two intermediate scenarios, which can be considered as alternative scenarios for answering the scenario question, depending on the specific context. The LL Toscana Nord identified the “Human Intensive” scenario, as

the better but not best one and the “Technology intensive scenario” as the worse but not worst one.

The Human Intensive scenario assumes that there is a **stable rural population in mountain areas** with basic **digital skills that allows them using apps on smartphones**. The local population and farmers and forest managers in particular have a high environmental awareness and **want to work in and preserve their territory**.

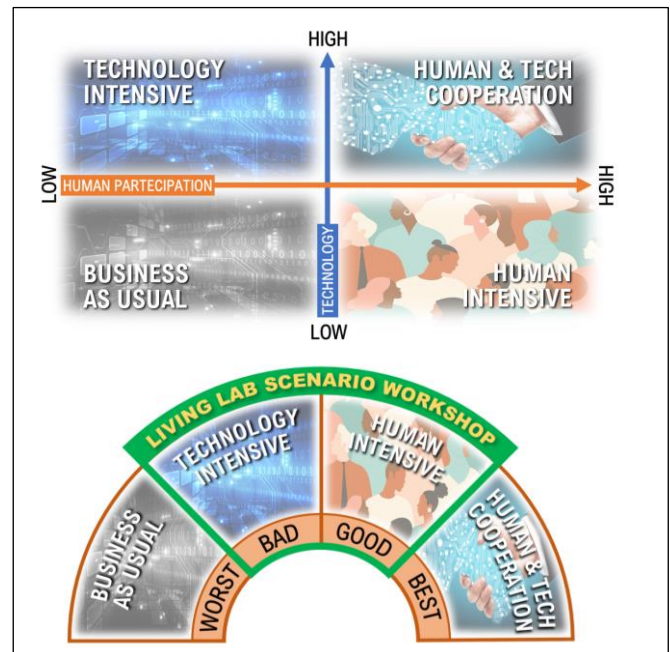


Figure 2. The four scenarios presented in the workshop and the judgement of the participants and selection of the two narratives to be developed.

In the Human Intensive scenario, on which the Reclamation Consortium (Consorzio Toscana Nord) is already working, the digitalisation process is aimed to increase the efficiency of an **alert system for the need of maintenance works on the drainage network in order to involve the local population in ordinary land management**. In particular the local farmers and forest managers can send an alert on the need for intervention in a specific site. If the intervention is a simple one, it will be assigned to the individual farmers, which will be paid for the delivery of the public service (maintenance work). Such payments represent **a significant part of small farmers’ income** and are an important **incentive for small local enterprises to stay in rural areas with mountain landscape**. This scenario is focusing on the possibility to expand the number of farmers participating in e-governance and delivering public services in isolated areas **through digitalisation**. The main digital

technology used will be a **digital platform to facilitate communication between public and private actors at different levels.**

In the Human Intensive scenario, the main winner is the local community that will be involved in the ordinary land management and have an efficient system contributing to the prevention of floods and landslides.

The Technology Intensive scenario assumes that the **rural population is decreasing in rural areas with mountain landscape** and the few people remaining do **not have specific digital skills** and are not willing to participate in e-government initiatives nor to collaborate with local administrations. However, a **high connectivity and broadband coverage**, together with a **lower cost of technologies** will allow IT companies to provide sensor and other digital tools to local administration. Public administration can then set up an automated system of land monitoring that will allow them to identify the need for maintenance works in the drainage network.

The occurrence of increasing extreme weather events ask for constant and increasingly precise land monitoring which can be reached with the use of a larger number of sensors and more data analysis using forecast models, with a high interoperability between instruments.

The combination of in-situ and remote sensing technologies will allow to provide information only to the technical staff of the Reclamation Consortium (Consorzio Toscana Nord) responsible for ordinary land management. There is no direct involvement of the local population.

The main winners in this scenario are the IT companies selling the sensors and all instruments needed to build the automated system.

POLICY RELATED DISCUSSION

The two main scenarios could be the result of different approaches in the development of innovation policies. While in the Human Intensive scenario, digitalisation is the result of a **mutual learning process among local actors, researchers and technology providers** in order to develop digital solutions tailored to the needs of the local community; in the technology intensive scenario, the IT companies that developed digital tools for environmental monitoring (as a result of a linear R&I process) will **offer their**

technologies to the local public administration. In addition, this scenario may bring to a centralisation of the monitoring tasks, with the consequence that local communities might lose control of the territory.

Some assumptions were clear in the policy related discussion: (1) the development of technologies for public services should be funded by public resources and cannot be the result of the free market, as it would not be profitable for IT companies. (2) In order to develop a digitalisation process, by 2031, there is a need to have a **higher connectivity and broadband coverage in rural areas with mountain landscape.**

The Human Intensive scenario is integrating digitalisation policies within local development policies, using digital tools to create an efficient ordinary land management system based on the involvement of local farmers and small enterprises with an e-government approach. The farmers in the workshop stated that they are willing to contribute in the delivery of public services in rural areas with mountain landscape and that the payment for such services represent a significant part of their income. This scenario implies a strong partnership between a large range of local actors, and effective local governance mechanisms. The outcome of this scenario would be a higher level of resilience of the local community.



CO-DESIGN ACTIONS TO INVOLVE CITIZENS IN PUBLIC SERVICE DELIVERY IN RURAL AREAS WITH MOUNTAIN LANDSCAPE IS A KEY POLICY ACTION.

The Technology Intensive scenario is based on digitalisation policies funding the development of the infrastructure to enhance connectivity and broadband coverage in marginal areas, the purchase of technologies available on the market by public administrations, and a public administration able to manage the complexity of the technologies. This scenario can be suitable in absence of an active local community and in case of a high level of land abandonment. However, the participants to the workshops were sceptical about the feasibility of this scenario. They stated that an automated process can detect big events in large water streams, but it cannot work for small and secondary water streams of the drainage network in rural areas with mountain landscape. This would increase the vulnerability of the community.



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POLICY OPTIONS

Promoting and funding initiatives for local communities' involvement in the process of developing digital solutions tailored to the local needs and skills.

- Supporting the development of networks involving local administrations and local actors in order to contribute in the identification of specific needs and skills and facilitate the involvement of citizens in the delivery of public services through digitalisation.

Supporting farmers' income to ensure their unique role in risk prevention

- Involving farmers in ordinary land management not only to alert on intervention needs, but also in small scale maintenance work in order to get an additional income relevant to maintain their economic activity on the territory
- Once a digital platform to manage the farmers' network will be set up, farmers will be able to provide more public services and be paid for it (incentive to stay in the area with their economic activity).
- Developing an e-governance approach with the direct involvement of farmers and local companies in public services delivery, thanks to digital tools facilitating the process.

Promoting the integration of the use of digital technologies for land monitoring with citizens in-situ observation.

- Providing resources to local administrations to purchase technologies needed to develop an e-governance approach and an environmental monitoring based on Earth observation data to be combined with in-situ observation data.

Increasing connectivity and broadband coverage in rural areas with mountain landscape.

- Increasing infrastructure functioning in order to facilitate the use of digital tools.

Increasing digital skills of public administrations and local communities.

- Improving digital skills and competences of public administration staff with specific technical trainings in order to avoid overlapping of competences of institutions at different levels.
- Improving digital skills of local communities in order to make citizens able to contribute in environmental monitoring of land and water streams in rural areas with mountain landscape.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy-makers on how to support the digitalisation process in the context of ordinary land management and hydrogeological risk prevention in rural areas with mountain landscape.

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Digitalisation in wildfires management

«**How can digitalisation contribute to reduce the damage caused by wildfires and make more effective firefighting and restoration of degraded land by 2031?**» is the focal question of the **Andalusian Living Lab (LL) coordinated by the University of Córdoba**. Representatives of all stakeholder groups gathered together to reflect on the current situation, the drawbacks and opportunities for the future. We imagined **two different scenarios for 2031**. A positive one in which augmented forest vulnerability due to Climate Change is balanced thanks to a combination of technological progress and increased awareness about the importance of forests. The second scenario envisions a lack of forest management and urban-forest interface planning. Coupled with uncontrolled land occupation and disappearance of traditional farming activities linked to forests, the result is a deterioration of forest areas. Policies should aim **at creating more resilient forest ecosystems, economically and socially revitalised rural areas, and quick and coordinated technological uptake** for wildfires management.

CONTEXT

The LL focuses on the influence of **digitalisation in firefighting and post-fire recovery** in Andalusia. Wildfires are an increasingly recurrent phenomenon with an everchanging and more unpredictable behaviour, which is highly relevant in a context of climate change. Minimising their impact requires a significant amount of effort, resources, and coordination from all the stakeholders, which are, at the same time, embedded in a complex Socio-Cyber-Physical system. Factors affecting this system include **rural depopulation** and **ageing** as well as agriculture land abandonment, which have led to an increase of forest areas, many of which are unmanaged. Also, the **boundaries between urban and forests** vary with new communities settling within or in the vicinity of forest areas, increasing the complexity of land management. Rapid **progress in R&D** applied to wildfire management requires a more agile and responsive public administration to establish **data protocols** and **data interoperability** mechanisms, and to orchestrate a better coordination with the communities and the private sector. **75% of forest properties are private** and their profitability is compromised by the high costs of forest management actions for fire

prevention and the delays in getting their revenues.

Finally, the sector is **demanding professional profiles** linking both forest and technological knowledge which requires the adaptation of universities to more suitable study programmes.

Technologies have significantly **evolved and contributed** to manage and to control wildfires faster and better. Currently, **Remotely Piloted Aircraft Systems** support wildfire monitoring; **smartphone devices and fast networks** allow for immediate communication and geolocation with fire brigades and the civil population; and **hardware improvements** enable to process vast amounts of data in real time. Moreover, public administrations in charge have got **strategies** in place to support the development and adoption of new technologies for wildfire management. These initiatives should be coupled with strategies and **policies to revitalise the rural areas both economically and socially**.



Figure 1. INFOCA fire control team on-site.
Source: INFOCA

RESEARCH APPROACH

Starting by the question of “**how can digitalisation contribute to reduce the damage caused by wildfires and make more effective firefighting and restoration of degraded land by 2031?**” we aimed to imagine plausible futures and which strategies would lead there.



WILDFIRE MANAGEMENT REQUIRES A STRONG COLLABORATION AMONG ALL STAKEHOLDERS. THE LIVING LAB PROVIDED A UNIQUE OPPORTUNITY FOR THEM TO INTERACT AND DISCUSS.

We followed a co-creative and collaborative approach by engaging all stakeholders involved in wildfires in Andalusia, namely, representatives of the public administration, civil society organisations, private sector and academia.

A first face-to-face session -held in December 2020 in Córdoba- enabled us to identify the situation of digitalisation in wildfire management and the key issues related to it.

A second session with stakeholders was organised in Seville in December 2021, where we combined interactive exercises with group discussion and presentations.

First, we created a timeline with the **milestones of digitalisation** in wildfire management in the past decade. Then, we agreed on the **Drivers of Change (DOC)** understood as critical uncertainties for the future, namely: The occupation and use of forest areas; real time information flows and the availability of digital tools to prevent and control wildfires; Climate Change; valorisation of forest resources and farming activities in forest areas; and communication channels and protocols. For each DOC, we proposed a set of assumptions, including a Business-as-Usual case, a more positive case, a more negative case, and, for some DOCs, an alternative one, neither positive nor negative. Participants then defined individually different **pathways** that could lead to the **creation of future scenarios**.



Figure 2. Participants during the workshop.
Source: UCO

SCENARIOS DEVELOPED

In group, we drafted two scenarios. The **positive scenario**, called “*In tech we trust*”, is envisaged within a context of moderate climate change, with forests being slightly more vulnerable to wildfires. In this scenario, a combination of technological progress and increased awareness about the importance of forests, achieves to revitalise the rural areas socially and economically, and to significantly reduce the impact of wildfires. It depicts a situation in which all stakeholders win. The main challenges of this scenario are the high dependence on technology and the reliance on people’s will to change their behaviour towards nature. This scenario offers opportunities to start new businesses associated to farming in forests and to exploit alternative forest resources.

The **negative scenario -Less shepherds, more developers-** envisions a future in which there is a lack of forest management and a lack of urban-rural interface planning. All these, coupled with uncontrolled land occupation and disappearance of traditional farming activities linked to the forests, results in the deterioration of forest areas. In this scenario, the use of technology is not enough to revert the situation and forest awareness is insufficient. Within a context of severe changes in the climate, the wildfire risk increases significantly. People leveraging from forests without contributing to their maintenance (newcomers and visitors) are the winners in this scenario. In return, the rural population are less benefited as they have been gradually expelled from the forest areas and deprived of their legacy. Some of the challenges that this scenario presents are linked to the use of technologies to (1)

benefit and to maintain the rural population as well as the farming activities that favour landscape resilience; (2) improve wildfire risk assessment, and predictions; (3) enhance forest management modelling; (4) valorise forest resources and (5) increase forests awareness.

POLICY RELATED DISCUSSION

Policy options discussed during the workshops were linked to sustainable forest management and rural development, land planning, the uptake of technologies and data management. Participants agreed that **sustainable forest management** policies should aim (1) to **valorise all the forest ecosystem** services, for example, by giving a market value to the carbon sequestered by forests; (2) to promote a sustainable use of **forest resources**; (3) to foster more **resilient forest ecosystems**, namely multifunctional and diverse; and (4) to **enable different forest land uses**, such as the combination with agroforestry or renewable energy installations. These measures could reduce the impact of wildfires while improving the profitability of forest properties. The main challenge is to choose an appropriate funding mechanism, as 'green taxes' are not mostly welcome.

Protocols for data gathering, data classification, data storage and data sharing are pivotal for a fluent **interoperability** of systems and a quick use of existing information by both public and private entities. Efforts should be made to establish **future-proof mechanisms for data management**, while keeping high standards of security and data protection. Progress in this sense should **not be detrimental to the digital gap** which currently exists in rural contexts; quite the opposite, it should aim to be more inclusive and to reduce the administrative burden for forest property owners and farmers.

Similarly, **sustainable rural development and land-use** policies should support an organised **occupation of urban-forest interfaces and rural areas**, as well as to ensure the **provision**

of high-quality services (e.g., ensuring reliable internet connection to allow for remote working, provision of medical and school services, etc.). These policies would benefit the rural population, especially if they are **combined with** more challenging strategies to **increase forests awareness** and to **maintain traditional agricultural activities** linked to forests, like grazing.



POLICIES SHOULD LOOK AT NEW STRATEGIES TO REVITALISE RURAL AND FOREST AREAS, CAPITALISING ON EXISTING RESOURCES AND KNOWLEDGE. TECHNOLOGIES CAN PLAY A KEY ROLE IN SUCH A TRANSITION.

Strategies to facilitate swift **uptake of technological advances** in wildfire management should be designed to allow the **participation of private companies**, which is currently very limited, and to improve the **coordination and allocation of resources**.

Finally, **collaboration frameworks** among public administration, private sector and communities should be promoted to deploy wildfire prevention, control, and recovery actions.

These strategies should aim to establish shared communication procedures and databases at different scales from local to supra regional level.



Figure 3. Remote cattle grazing control
Source: Pixabay



This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

POLICY OPTIONS

Sustainable forest management

- To assign market value to forest ecosystem services and to channel the revenues through appropriate funding mechanisms to enable the implementation of wildfire prevention measures.
- To promote a sustainable use of the forest resources and to raise awareness on sustainable use and property rights.
- To create more diverse and multifunctional forests through appropriate silviculture, the increase of species variability and livestock grazing.
- To enable different forest land uses, such as the combination with agroforestry or renewable energy installations.

Data management

- To establish common and interoperable protocols to gather, classify, store and share data among the platforms used by stakeholders, quickly and safely.
- To establish accessible mechanisms for citizens to allow them contributing, consulting and using relevant data.
- To establish good data management practices to reduce the administrative burden for citizens.

Sustainable rural development and land-use planning

- To regulate urban planning in rural areas and forest-urban interfaces to support a controlled increase of settlements.
- To assign resources to ensuring the provision of high-quality services in rural areas.
- To assign resources to maintaining and to revitalising traditional farming activities in forests.

R&D

- To boost the development and use of new technologies for wildfire prevention strategies and for more efficient soil restoration measures.

Collaboration framework

- To set up frameworks to enable the coordination of public administration, private companies, and communities to manage wildfire prevention, control, and recovery at multiple scales (from local to national).

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalisation in the context of wildfire management in Andalusia.

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A key decade in terms of digitalisation for the Maestrazgo and Gúdar-Javalambre rural areas

The present policy brief summarises the work performed in the Maestrazgo and Gúdar-Javalambre Living Lab (LL). This LL works around the topic of how technology can help to increase the attractiveness of the territory. In order to work on scenario planning, we organised a workshop with stakeholders chosen by their experience, relevance in the LL context, expertise and strategic views. Together, we worked around one scenario question: **How digitalisation and the 2030 agenda will change Maestrazgo and Gúdar-Javalambre by 2031?** We also worked on 4 scenarios: Worse not worst scenario, better not best scenario, dystopia and utopia scenarios. In this policy brief, more information is provided on two most plausible scenarios. Around those scenarios, discussions on policies emerged, especially on policies that will be able to boost and increase the attractiveness of the LL. Digital innovation is needed from a rural area point of view. To achieve that, further training on digital skills will be needed, especially for the aged population, as well as services to accompany older people in the process, with the aim of leaving no one behind.

CONTEXT

Our Living Lab is placed in the territories of Maestrazgo and Gúdar-Javalambre, located in Teruel, in the southeast of Aragón (Spain). Both areas are known for having a great territorial dispersion among their villages with a low population density, representing less than 1 percent of the regional population in a territory that occupies 7.44 percent of Aragón's surface area.

In terms of digitalisation, Spain ranks 11 out of 28 EU Member States in the 2020 edition of the Digital Economy and Society Index (DESI). Over the last ten years, National and Regional public authorities have developed public policies, projects and actions to promote the development of the information society across the country and region, respectively. However, despite the many initiatives towards broadband coverage and despite the good results of the country in general, the area covered by the LL could be described as greatly affected by white and grey areas (without connectivity or with service degradation due to the use of obsolete connection technology).

The complicated orography of this territory, with mountainous areas, a large forest mass, heavy snowfalls or strong storms, makes the communication and access to digitalisation difficult.

This situation has been clearly exposed with the COVID-19 crisis. Although Spain is quite well positioned in terms of digital public services and open data, digital skills remain an issue for a high percentage of the aged population.

Great expectations are placed on the possibility of achieving the expected infrastructure. Digitalisation and the implementation of new technologies must be promoted in order to give a real leap towards digital transformation and generate products with greater added value. Accessibility is fundamental and high quality broadband is needed in first place to improve the actual deficient communications.



RESEARCH APPROACH

The scenario question this LL worked with was: **How digitalisation and the 2030 agenda will change Maestrazgo and Gúdar-Javalambre by 2031?** In order to work on the scenario planning, we organised a hybrid face-to-face and online event with 7 stakeholders that were chosen by their experience, relevance in the LL context, expertise and strategic views.



THIS DECADE IS A KEY DECADE FOR OUR LIVING LAB. AN IMPROVEMENT ON DIGITALISATION IS EXPECTED TO MAKE THE TERRITORY MORE ATTRACTIVE FOR VISITORS AND FUTURE INHABITANTS.

We identified those Social, Technological, Environmental, Economic and Political external and internal parameters (drivers of change) that can or cannot be influenced by stakeholders within the scenario. Working with those drivers we developed four assumptions that led to 4 scenarios: Worse not worst scenario, better not best scenario, dystopia and utopia scenarios.

Our LL was described by the stakeholders as a geographically exhausted model, with underutilised resources. The final aim is to be able to really encourage people to move to rural areas in order to avoid complete depopulation and the abandonment of sparsely inhabited villages.

Also, they feel there is a need to really change the discourse, stop talking about the “España vaciada – Emptied Spain” and be able to better sell their territory.

SCENARIOS DEVELOPED

The two main scenarios used for this LL are the worse not worst and better not best scenarios. In the first one, the potential positive impacts of digitalisation have not improved the future of the LL by 2031. Demographic does not change significantly and rural ageing and population density is the same. Even though some new digital services are emerging, they are not linked to the requested level of infrastructure. Employment levels are the same, with no new job offerings but at least the

availability of labour force is not a worrying issue anymore. The region has not been able to catch the attraction of young people and local administration has not been able to gain importance. In fact, the territory feels like it has been forgotten.



Figure. Stakeholders' workshop

For the second scenario, the positive impacts of digitalisation have in fact improved the future of the LL in 2031. Even though the demographic situation remains the same and that there is still an ageing situation, digital APPs and services are emerging and new services are being implemented thanks to a better connectivity and broadband access. Among those APPs can be found the ones related to Administration and Education uses, as well as a new APP for the renewal of previously abandoned houses.

The changes on the extreme weather conditions have led to new economic activities. Due to the improvement of rural infrastructures, basic services and broadband connectivity, there is a slight increase in employment and people are able to work from home, which also help to increase the number of inhabitants that have decided to move from urban areas to rural ones. National implication is achieved, which translates into new strategies and funding for the provision of services.

POLICY RELATED DISCUSSION

The context of this LL is complex, as briefly explained above. The territorial dispersion and distribution of this region is one of the reasons of the difficulties found so far, being an extensive and depopulated territory with a great natural and cultural richness and with a deficient infrastructure from the technological point of view (lack of broadband and telephone coverage). The number of inhabitants is not high enough and strategically, they are not profitable for large companies.



THE COVID-19 PANDEMIC HAS SHOWN THAT THE DEFINITION OF BROADBAND USED IN RECENT YEARS APPEARED TO BE INSUFFICIENT FOR CITIZENS AND BUSINESSES TO OPERATE EFFECTIVELY WITH THE PROLIFERATION OF CONFERENCES, ONLINE MEETINGS, REMOTE WORK, E-LEARNING, ONLINE SHOPPING AND ENTERTAINMENT SERVICES THAT HAVE BECOME PART OF EVERYDAY LIFE.

Those difficulties have affected all levels of the rural population, resulting in a poor perception of the rural environment as a potential location for entrepreneurial initiatives.

The limitations of broadband extend to agricultural workers, as they do not have a fixed place to carry out their activity, but work in large areas of the countryside where it is more difficult for telephone signals to reach them. That is why the Agriculture and Forestry sectors are supported with a digitalisation strategy launched in 2019 and a great impulse will be given in the following years because of the number of plans emerging from the COVID-19 crisis and the recovery plans. One year later, in July 2020, the Spanish Digital Agenda, Digital Spain 2025, was presented. It is expected that it will help the country's digital transformation by guaranteeing digital connectivity, deploying 5G, strengthening cyber security capacity and digitalising public administration and companies.

That same summer, in June 2020, Aragón presented The Aragonese Strategy for Social and Economic Recovery with the aim to implement a programme to fight the effects of the social and economic crises caused by the pandemic in Aragón. This strategy includes specific lines to promote digitalisation, to facilitate the access to infrastructures and to offer the necessary training services so the digital transformation is really achieved.

Therefore, the discussion during the workshop did not focus on the need of new policies but on the need to focus on those **policies that will be able to boost and increase the attractiveness of the LL.** This is linked to policies that will be **able to encourage life in villages.**

Digital innovation is needed from a rural area point of view.

To achieve that, **further training on digital skills** will be needed, especially for the aged population, as well as **services to accompany older people in the process**, with the aim of leaving no one behind.

Remote services offered by Administration, Medical services and Online Education were among the scenarios discussed with the LL so the policy options listed thereafter endeavour to cover a balanced implementation of all these services in the territory.

Even Metaverse (a virtual-reality space in which users can interact with a computer-generated environment and other users) appeared in the discussion for activities such as shopping, online classes and medical consultation.





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POLICY OPTIONS

To boost and increase the attractiveness of the territory

- The territory needs to be able to learn from some next-by examples and really be able to improve their image in terms of communication. In other words, it needs to be able to better “sell” the attractiveness of the territory and use the digital tools at hand for it.
- In that respect, a change in the discourse from the inside is encouraged. The selling image for the last 50 years has been the same and it is now time it is time to enhance the value of the territory.

To encourage life in rural environments

- The horizon faced by future generations worry this LL, because of the lack of opportunities for them. That is why digitalisation should help to increase the vision of the attractiveness of rural areas and village life while also focusing on protection of natural resources and of the environment.
- With the emerging possibilities of remote working we think this recommendation should be one of the first to be tested.

Designs applied to rural areas

- Planning from the point of view of villages and rural areas instead of cities.
- With special tax benefits to encourage investment in innovation and digitalisation.

Training on digital skills

- The digital inclusion of all citizens is needed, so equipment and training to achieve an increase of digital literacy and the use of internet in homes to reduce the existing digital gaps are also required.

To introduce a facilitator service for older people

- To really achieve an optimal digital transformation and specially, to avoid leaving anyone behind, older people need to be accompanied in the use of all the new emerging digital services.
- In order to do that, we recommend introducing liaison persons, facilitating agents to be the connection between the population that needs it and the new digital services implemented.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalization in the context of rural attractiveness in Aragón (Spain)

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Digitalisation of wine production in France

This policy brief presents the results of interviews and workshops with stakeholders carried out in the Living Lab (LL) Inno'vin, in the Nouvelle-Aquitaine Region, France. The scenario question of this LL was: **"What will French viticulture look like in 2031 in connection with the digital evolution?"**

Within this context, two scenario narratives were elaborated. The "better not best" (BnB) scenario considers a very diversified supply of digital technologies, the acceptance of certain technologies, effective training on digital technologies and data management, and the implementation of digital wine production technologies with positive socioeconomic and environmental impacts. The "worse not worst" (WnW) scenario considers a very diversified supply of digital technologies, the acceptance of some non-intrusive technologies, basic training on digital technologies and data management, and a clear digital divide regarding the implementation of digital wine production technologies. Five central policy recommendations are provided based upon the suggestions of the scenarios.

CONTEXT

The LL Inno'vin is a wine cluster which brings together nearly 180 industry players. It supports companies in their innovation projects and has successfully supported more than 100 projects since 2010, with the aim to find solutions to overcome challenges in the wine sector. Inno'vin promotes the competitiveness of companies in the wine industry, and contributes to their economic development and maintaining of leadership position.

The objective is to understand the stakes of digitalisation in the wine value chain as well as the impacts and local needs for policy-making. Digital technology is considered as a tool that can address multiple challenges or needs. The French wine sector focuses on two main challenges: (1) agro-ecological transition for vineyard with a reduction in pesticides use and lower environmental impacts and (2) the competitiveness of French wines in national and international markets, with digitalisation driving the renewal of links with consumers and the disintermediation.

The wine industry, like agriculture in general, has been digitalised very quickly (CAP declarations' dematerialisation, weather stations, GPS) and continues to be digitalised, mostly using basic and generic tools. However, for several years, the dissemination of digital technologies relating to vineyards has been slowing down due to the specific characteristics of the sector. Well adapted digital tools are not yet available on the market (in most cases, the innovations are still at the prototyping stage).

At the upstream of the value chain there are several adoption levels for digital tools, depending first on the geographical indication and then on the type of vineyards belonging to financial groups or families. Downstream, traders have been investing in digital technologies for marketing and sales for years, while producers are new on this question.

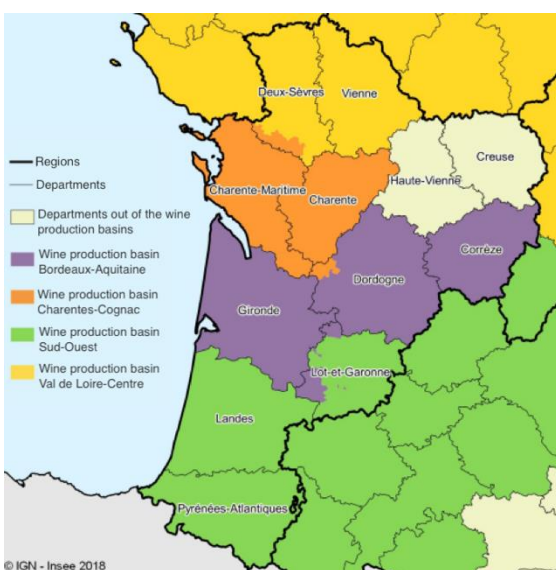


Figure 1. Wine production basins in Nouvelle-Aquitaine
Source: INSEE, 2018

RESEARCH APPROACH

The scenario question discussed with stakeholders in the two workshops is as follows: **“What will French viticulture look like in 2031 in connection with the digital evolution?”**

The stakeholders involved included farmers, cooperatives, farmer unions, researchers, policy advisors, founders of Agritech start-ups and farm advisors.

These workshops followed the STEEP-methodology where the discussion focused on the Social, Technological, Environmental, Economic and Political aspects related to the impacts of digital technology.



AN OPEN AND PARTICIPATORY EXERCISE WAS CARRIED OUT WITH THE STAKEHOLDERS TO IDENTIFY THE DRIVERS OF CHANGE AND PLAUSIBLE FUTURE PATHWAYS

During the online scenario workshop held in January 2022, the elaboration of scenario narratives was carried out through defining drivers of change and identifying plausible future pathways.

First, the participants agreed upon the following finalised version of the scenario question: **“What will French viticulture look like in 2031 in connection with the digital evolution?”**

Accordingly, an open and participatory forecasting exercise was carried out to answer this question. The participants were able to identify the drivers of change and discuss the possible evolutions of those drivers.

Then, the LL team worked on two so-called intermediate scenarios (“better but not best scenario” and “worse but not worst scenario”) characterised by different and plausible evolutions of socioeconomic, environmental, political and technological drivers. Two extreme scenarios (referring to “utopian” and “dystopian” situations) were also depicted.

SCENARIOS DEVELOPED

Because we used the STEEP methodology, discussions went much broader than just digital technology and touched upon issues such as environmental policies and knowledge, as well as the broader power structure in the wine industry.

Domain	Drivers of change
Social	▪ Demographics of the <u>viticultural</u> population ▪ Demand for a more environmentally friendly viticulture ▪ Acceptability of local residents on the contribution of new technologies in the vineyards ▪ Training of the workforce
Technological	▪ Data sharing / Interoperability ▪ Access to technological developments
Economic	▪ Globalization Vs Local
Environmental	▪ Extreme weather events ▪ Carbon neutrality in viticulture
Political	▪ Role of public authorities in the adoption of new technologies applied to vineyards ▪ Legislation on the management of the wine industry

Figure 2. Drivers of Changes identified

Source: Scenario workshop with partners of Inno'vin

In the “better but not best” (BnB) scenario, digitalization has improved the wine making process in France. At the upstream of the wine chain, it has helped winegrower’s adaptation to climate change, by allowing them to predict extreme weather events in advance, to manage and control what happens in the vineyards 24/7, to replace herbicides with automated weeding robots and to anticipate diseases more quickly. Wines are also more environmentally friendly than a decade ago and most wineries have managed to become carbon neutral. At the downstream of the wine chain, digitalization has been a catalyst for a better relationship with consumers, it has brought more transparency about the practices and improved the way wine is sold online.

In the “worse but not worst” (WnW) scenario, there is a low level of digitalization in the French wine industry for many reasons: The digital technologies have become more complex and expensive. The education system has not been transforming fast enough and students are not trained on the use of digital technologies. The infrastructure for data sharing is poorly developed and the winegrowers are reluctant to share their data. Being unable to make good use of digital technologies, many winegrowers cannot manage to keep the quality of their wine.

POLICY RELATED DISCUSSION

The discussion in the workshop around the drivers of change and challenges for French viticulture and wine value chain has helped to identify local needs for digital policy-making.

Among the drivers of change identified by the participants, first of all, the increasing social demands for a carbon neutral or environmentally friendly viticulture, and unpredictable trends of climate change and especially extreme weather events, are the most important motivating factors nowadays for agroecological transition in the wine sector. Digital policy can significantly influence on the level of digitalisation and its capacity to meet the social demands related to these issues. Meanwhile, public funding and other resources dedicated to environmental concerns can be mobilised for the development of digitalisation.

Second, public policy plays important roles in the adoption of new technologies applied to vineyards, including public funding to encourage the adoption of new digital technologies, legislation to permit, restrict or even ban the use of certain technologies under specific conditions, supports to guarantee equal access to technological developments, training of the workforce, regulation of data sharing and interoperability, and others.

Third, the acceptability of local residents on the use of new technologies in wine making should also be considered. Improvements can be made through policies promoting civil digital education, transparency of farming practices, and communication of the contributions of digitalisation with local residents and consumers.

Finally, the legislation on the definitions and standards of wine quality and classification is a peculiar but critical influencing factor for the wine sector. Efforts should be made to eliminate and prevent potential prejudice against using digital technologies, for example, in the evolution of the Protected Designation of Origin (PDO) system, and legislative restriction on industrial viticulture compared to the terroir viticulture.



POLICY-MAKING CAN BE VERY IMPORTANT FOR DIGITALISATION IN WINE SECTOR BY INFLUENCING ON THE DRIVERS OF CHANGE, INCLUDING NOT ONLY THE DEVELOPMENT AND ADOPTION OF DIGITAL TECHNOLOGIES, BUT ALSO THE SOCIAL ACCEPTABILITY OF USING DIGITAL TECHNOLOGIES UNDER SPECIFIC NATIONAL AND INTERNATIONAL SOCIO-POLITICAL CONTEXT.

The key challenges for Inno'vin mainly include the growing average age of people working in viticulture, increasing extreme weather events, rising social expectations for an environmentally friendly wine industry and growing attacks or lawsuits filed by NGOs or residents against farmers using autonomous machinery. The risks linked to digitalisation are such as unequal access to digital technologies because of differences in affordability and digital skills, data security problem, legislative restriction imposed on industrial viticulture using digital technology (e.g. no right to apply for certain labels), and others. The opportunity is that the currently rapid development of digital technologies has great potentials in contributing to meeting the social demands for environment concerns. The differences between the scenarios are mainly in their level and capacity of digitalisation (from low to high) facing the challenges and risks, however, the designing of scenarios also concerns trade-offs between different targets.



UNREALISTIC TO EXPECT PERFECT SOLUTIONS ADDRESSING ALL THE CHALLENGES AND RISKS, THE DESIGNING OF SCENARIOS HAS TO CONSIDER TRADE-OFFS BETWEEN DIFFERENT TARGETS.

In the case of Inno'vin, the most remarkable contradiction is that the development of highly intelligent digital technology is needed to be able to predict extreme weather events or achieve environmental goals, however, the lacking of younger population working in viticulture suggests that public aids should be first used to promote user-friendly simple technologies. Otherwise, there would be unequal access to digital technology between different types of vineyards.

The BnB scenario suggests a policy option emphasising on the training of farmers and communicating with residents and consumers to promote transparency of farming practices. The second priority is the development and promotion of high-performance digital technology. A diversified adoption of digital tools in different types of farms is accepted. The WnW scenario suggests the results of a weaker version of this policy option.



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POLICY OPTIONS

Encouraging the development and adoption of digital technology in viticulture and wine industry

- Providing public funding to research and innovation on digital technologies to reduce environmental impacts and carbon footprint.
- Encouraging research and innovation on digital technologies to strengthen the capacity to predict climate change and extreme events.
- Establishing legislative permission for farmers to do experimentation on the use of digital tools.
- Supporting farmers for the adoption of digital technology and to prevent potential risks.
- Promoting equal access to digital tools and technologies.

Increasing the number of farmers capable to use digital technologies

- Promoting professional education and youth engagement in agriculture.
- Improving the attractiveness of working in the wine sector.
- Developing appropriate training programmes for the older generation.
- Developing simplified or automated versions of the digital technologies.

Valuation and communicating on the contribution of digitalisation

- Labelling the contributions of digital technologies in reducing environmental impacts, improving carbon neutrality, etc.
- Communicating with residents and consumers on the advantages of using digital technologies.
- Developing participatory approaches (e.g. auditions) involving different stakeholders in order to prevent potential risks relating to digitalisation.

Influencing on national and international legislation on wine sector

- Promoting positive consideration of digitalisation in the definition and standards of wine (e.g. Protected Designation of Origin - PDO).
- Recognising the rightful place of industrial viticulture using digital technologies.

Promoting data sharing and security

- Facilitating data collecting and sharing between stakeholders and along the wine value chains.
- Creating an open data platform dedicated to the wine sector.
- Establishing regulation on data use and security.
- Establishing a standard of data interoperability adapted to the wine sector.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy-makers on how to support digitalisation in the context of agroecological transition in viticulture in France.

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Digital tools to help reduce agricultural inputs

This policy brief presents the results of interviews and workshops with stakeholders carried out in the Living Lab (LL) Agronov, in Bourgogne-Franche-Comté Region, France. The scenario question of this LL was **"What will be the contributions of digital technologies to accompany the reduction of inputs in agriculture by 2031?"**

Within this context, two scenario narratives were elaborated. The "better not best" (BnB) scenario considers competitive and relevant digital solutions, good evolution in terms of training and digital literacy, advisory services, and data management, strong potential of robotics and implementation of digital technologies to reduce the use of agricultural inputs. The "worse not worst" (WnW) scenario considers fragmented and costly digital solutions, poor training and digital literacy, slow evolution of advisory services, failing data management, weak potential of robotics and implementation of digital technologies with less obvious impacts on the use of agricultural inputs. Five central policy recommendations are provided based upon the suggestions of the scenarios.

CONTEXT

The LL Agronov is an agricultural cluster dedicated to promoting agroecological transition. Bourgogne-Franche-Comté (BFC) is an agricultural region characterized by intensive large-scale cropping systems and livestock systems with many high-quality labelled products. The region includes two main territories (i.e. plains and mountains), and an important urban area (Dijon). Agronov is composed by 61 members and 80% of them are companies (including start-ups). The mission of Agronov is to pool skills within an ecosystem associating not only consular actors, professional agricultural organizations, but also research institutes and training organizations. It aims to understand the needs of actors in the field, in order to promote innovation through experimentation and transfer mechanisms within various sectors of agriculture in the BFC region.

The objective is to determine how digital technology can contribute to the emergence of innovations in favour of agroecological transition in agriculture. It concerns the dissemination of digital tools to be used by agricultural stakeholders and local communities in favour of more sustainable agriculture for different types of products and in connection with the relocation of food production.

The analysis of the impacts of digitalisation leads us to three different topics: (1) digitalisation uses and their specificities according to the characteristics of farms (including digital culture, financial sustainability, types of products and location); (2) the obstacles to the adoption of digital technologies (weaknesses in interoperability, "white areas" without good internet connectivity in rural areas, low standardisation of digital tools and plethora solutions offered); and (3) factors accelerating the digital transition to serve agroecological transition (generation renewal in farmers, and new forms of advisory support).



Figure 1. The partner network of Agronov in the Region of Bourgogne-Franche-Comté
Source: website of Agronov

RESEARCH APPROACH

The scenario question discussed with stakeholders in the two workshops is as follows: **"What will be the contributions of digital technologies to accompany the reduction of inputs in agriculture by 2031?"**

The stakeholders involved included farmers, cooperatives, farmer unions, researchers, policy advisors, founders of agritech start-ups and farm advisors.

These workshops followed the STEEP-methodology where the discussion focused on the Social, Technological, Environmental, Economic and Political aspects connected to the impacts of digital technology.



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SCENARIOS DEVELOPED

Because we used the STEEP methodology, discussions went much broader than just digital technology and touched on issues such as environmental policies and knowledge.

Domain	Drivers of change
Social	▪ Societal expectations for a more environmentally friendly agriculture ▪ Training ▪ Evolution of agricultural advisory services
Technological	▪ Data sharing / Interoperability/Sovereignty ▪ Robotics
Economic	▪ Economic valuation of agroecological labels ▪ Competitiveness and economic relevance of the proposed solutions
Environmental	▪ Extreme weather events ▪ Pressure on natural resources (water, soil, biodiversity)
Political	▪ Right to experiment on a certain number of practices ▪ Payments for Environmental Services (PES)

Figure 2. Drivers of change identified

Source: Scenario workshop with partners of Agronov

In the "better but not best" (BnB) scenario, digitalisation has improved the way agricultural inputs are used in France, and French agriculture has managed to reduce its pesticides use by at least 40%. A paradigm shift has been needed to move from curative crop protection to other means using no chemical pesticides to prevent the appearance or development of pests in the crops. Digital technologies have also helped to reduce the pressure on natural resources, though being adopted to varying degrees depending on the sector and the actors. Another game changer is that farmers are allowed to do experiments and improve their performances in a local and situational way in the search for levers to reduce inputs. Open innovation is seen everywhere and the boundaries between scientists and practitioners become blurred. Academic research and field solutions are better connected.

In the "worse but not worst" (WnW) scenario, digitalisation has helped French agriculture to reduce pesticides use by less than 20%. The lack of digital literacy remains a burden for French agriculture. Farmers are not given adequate training on the proper use of inputs, digital technologies, and data. Farm advisors only partially master digital tools and technologies, and fail to give proper advice. The payments for environment services (PSE) are insufficient to allow the sector to invest fully in digital solutions promoting environmental services from agriculture. Furthermore, robotics has shown limited potential (e.g. too costly and mainly focusing on the labour issue). Farmers do not have regulatory approval to conduct experiments. They can only rely on references and standards that are sometimes not adapted to their situation.

POLICY RELATED DISCUSSION

The discussion in the workshop around the drivers of change for the reduction of inputs in agriculture in France suggests the following three levels of local needs for digital policy-making:

First, the drivers such as societal expectations for a more environmentally friendly agriculture, increasing awareness of the pressures on natural resources, and unpredictable trends of climate change and especially extreme weather events, are the most important motivating factors nowadays for agroecological transition and reduction of inputs in agriculture. Digital technologies have great potentials to contribute to meeting social demands related to these issues. Public funding and other political resources linked to environment concerns can be mobilised for the development of digitalisation.

Second, as for the development of digitalisation itself, it concerns the improvement of digital technologies, especially robotics, training of farmers and agricultural advisors, secured data sharing and data interoperability, valuation and communication of the contributions of digitalisation, etc. These are all among the drivers selected by the participants, asking for public funding and other supports such as networks of partnerships, platforms, and expertise. Specifically, the participants of the workshop emphasised the right of farmers to do experiments, and claimed it as a critical factor for promoting open innovation adapted to local needs in the peculiar context of the BFC Region.

Finally, the participants think that the competitiveness and economic profitability of the digital solutions should also be considered. In order to make the contributions of digitalisation more visible, other than the traditional social and political ways, e.g. labelling, prize, etc., alternative ways of economic valuation should also be developed, for example, the economic valuation of agricultural labels on the markets and payments for environmental services (PES). Related legislation and policy-making are thus needed.



THE COMPETITIVENESS AND ECONOMIC PROFITABILITY OF THE DIGITAL SOLUTIONS SHOULD ALSO BE CONSIDERED.

POLICY-MAKING NEEDS TO SUPPORT ECONOMIC VALUATION OF THE CONTRIBUTIONS OF DIGITALISATION IN ORDER TO MAKE THEM MORE VISIBLE.

The key challenges for Agronov mainly include constraints to environmental performances, increasing extreme weather events, and the pressures from markets in terms of economic competitiveness. The risks linked to digitalisation include for example unequal access to digital technologies, data security problem, legislative constraints imposed on industrial agriculture using digital technology, etc. The opportunity is that the currently rapid development of digital technologies has great potentials in contributing to the growing requirement for an environmentally friendly agriculture. The differences between the scenarios are mainly in their level and capacity of digitalisation (from low to high) facing the challenges and risks, however, the designing of scenarios also concerns trade-offs between different targets.



UNREALISTIC TO EXPECT PERFECT SOLUTIONS ADDRESSING ALL THE CHALLENGES AND RISKS, THE DESIGNING OF SCENARIOS HAS TO CONSIDER TRADE-OFFS BETWEEN DIFFERENT TARGETS.

In the case of Agronov, the development of robotics, automated machines and other intelligent digital technology is needed in order to be able to predict extreme weather events or achieve environmental goals, however, it can be contradictive with the low level of digital training in farmers, social rejection against robotics and industrialised production for environmental concerns, economic competitiveness of the system because of high cost of robotics, and other aspects.

The BnB scenario suggests a policy option emphasising on the training of farmers and agricultural advisors, communicating with residents and consumers, and development of economic valuation and payments for environmental services to improve the visibility of the contributions of digitalisation. The second priority is the development and promotion of high-performance digital technology. A diversified adoption of digital tools in different types of farms is accepted. The WnW scenario suggests the results of a weaker version of this policy option.



This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

POLICY OPTIONS

Encouraging the development and adoption of digital technology to reduce inputs use in agriculture

- Providing public funding to research and innovation on digital technologies to reduce inputs use in agriculture and pressures to natural resources (water, soil, biodiversity, etc.).
- Encouraging research and innovation on digital technologies to strengthen the capacity to predict climate change and extreme events
- Supporting farmers for the adoption of digital technology and to prevent potential risks.
- Promoting equal access to digital tools and technologies.

Training to farmers and agricultural advisors

- Promoting professional education preparing new farmers.
- Improving the attractiveness of working in the agricultural sector.
- Developing training programmes and communicating platforms for agricultural advisors.
- Developing appropriate training programmes for the older generation.
- Developing simplified or automated version of the digital technologies.

Valuation and communicating on the contributions of digitalisation

- Communicating with residents and consumers on the advantages of using digital technology.
- Improving the legislation and political supports to transfer the contributions of digitalisation into economic benefits to farmers, e.g. economic valuation of agricultural labels, Payments for Environmental Services, etc.
- Developing participative approaches involving different stakeholders to prevent the potential risk of digitalisation.

Encouraging bottom-up open innovation in agriculture

- Legislative permission for farmers to do experimentation on the use of digital tools.
- Establishing networks associating multiple stakeholders to facilitate the innovation of farmers and experience sharing with other stakeholders.

Promoting data sharing and security

- Facilitating data collecting and sharing between stakeholders and along the value chains.
- Creating an open data platform dedicated to the agriculture sector
- Establishing regulation on data use and security.
- Establishing a standard of data interoperability adapted to the agricultural sector.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalisation in the context of reducing agricultural inputs to promote agroecological transition in France.

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Digitalisation in Scottish crofting communities

In the Scottish Living Lab (LL) in the DESIRA project, we worked with a rural crofting community to understand the main opportunities and challenges relating to digitisation, and the vision that the community has for the next ten years.

Whilst digitisation presents many potential gains for the crofting community, there are challenges with realising these, mainly regarding digital skills and infrastructure. The positive future vision developed by the community focuses mostly on community resilience, wellbeing and quality of life.

The negative future vision points to how digitisation might support the decline of rural places such as Scottish crofting communities.

Policy should support these communities to access digital skills training and infrastructure, affordable housing, and empower them to participate in decision-making at the local level.

CONTEXT

In the Scottish Living Lab (LL) on the DESIRA project, we are working with a crofting community on the West Coast of Scotland to understand the impacts of digitisation in the past, present and future of the community. The LL is situated in a remote rural region of Scotland – the Coigach and Assynt region of Wester Ross. Crofting is a form of small-scale agriculture typical in Scottish Highland and Island communities. Crofters are pluri-active – they have multiple economic roles (various jobs etc.), because crofting itself is not a viable means of making a living for a household.

In relation to digitalisation, the general existing issues of the LL are mostly related to skills levels and access. Connectivity is not strong across the entire region. Broadband connectivity was installed fairly recently (beginning of 2020) and although this serves a large portion of the local population, it is not accessible to all – therefore digital divides are still present within the community. Furthermore, skills levels vary, which in turn impacts on the potential for digitalisation to bring positive benefits to the region.

Policy is in place to support the roll out of broadband connectivity across all of Scotland, including in remote rural regions (e.g., the Universal Service Obligation for Broadband (USO) implemented by UK Government which aims for 10 MBPS coverage for all) as well as to support the gaps in digital skills (e.g., UK Government Skills Toolkit which seeks to improve digital skills in a number of regions and sectors). Policy efforts to improve these issues are ongoing and the urban-rural digital divide persists in Scotland.



RESEARCH APPROACH

The objective of a recent workshop in the LL was to co-produce with stakeholders scenario narratives in order to identify areas of required support in the next decade.

The workshop asked: **What will crofting communities be like in 2031 given future digitisation?**

Participants explored plausible positive and negative scenarios for their community.

A participatory, normative methodology was implemented. Two main 2031 scenarios were developed – one reflecting a “better not best” (positive) future, and one which reflects a “worse not worst” (negative) future.



SCENARIOS DEVELOPED

The following scenarios were the two that were developed in most detail in the workshop.

“Gross Domestic Happiness” (Better not best best scenario):

This scenario describes a future in which the focus of development is no longer on technology corporations and large businesses profitability. The metric of success (“Gross Domestic Product”) has radically switched to embrace quality of life including the mental health and wellbeing of communities. Collective happiness goals alongside reinvesting funds into local communities, rising employee satisfaction levels, and an increase in flexible working

arrangements were key factors in the scenario.

“Digital Clearances” (Worse not worst scenario):

This scenario references the tragedy of the Highland Clearances, a forced eviction of small-scale farming communities concentrated upon the Highlands and western islands, between 1750 and 1860 in Scotland. This is drawn upon to evoke a vision of a bleak future in which the powerful elite disenfranchise crofting communities, enabled in their power by rapidly advancing digitalisation. The scenario is illustrated with visions of mass school closures, and escalating tourism driving locals out of the property market causing youth outmigration and declining local communities.



RURAL CROFTING COMMUNITIES HAVE CLEAR IDEAS ON THE DIRECTION THEY WISH TO TAKE IN THE NEXT TEN YEARS – THE POSITIVE FUTURE VISION CENTRES LARGELY ON COMMUNITY WELLBEING AND QUALITY OF LIFE. LIKEWISE THEY ARE CLEAR ON THE THREATS TO REALISING THAT VISION. DIGITALISATION CAN SUPPORT EITHER POSITIVE OR NEGATIVE PATHWAYS TO RURAL FUTURES.



POLICY RELATED DISCUSSION

Proposing a shift to developing the mental wellbeing of employees and residents outlined in the better not best scenario, recalls the Inclusive Growth mandate set by the Scottish Government. Within this broader remit, the National Planning Framework (NPF) offers a long-term vision for development across all of Scotland including rural areas, seeking a place-based approach to driving equality and inclusivity within the job market - promoting wellbeing and the creation of sustainable and diverse places. The fourth iteration of the NPF is currently in draft and is expected to be approved and adopted by the Scottish Parliament later in 2022. Setting out a vision for 2045, emphasis is upon planning decisions (including crofting land) to support the goal of achieving net-zero by 2045 in Scotland. An increase in flexible working arrangements and supporting diverse economies requires a notable investment in broadband connectivity to remote rural areas. Equitable and reliable access to broadband speeds comparable to urban areas is paramount to driving investment in rural crofting communities. Building on the success of the Digital Scotland Superfast Broadband (DSSB) programme, the Reaching 100% (R100) programme aims to ensure every business and home has access to superfast broadband. The Covid-19 pandemic has exacerbated the need for reliable broadband connectivity across the whole of Scotland. The rollout takes time and needs to account for significant geographical differences.

In the second scenario, the outmigration of younger working-age residents was identified as key to the overall decline of crofting communities. Access to and affordability of both crofting land and housing are identified as key challenges to not only outward emigration but also to prospective new entrants to crofting. In 2021, the National Development Plan for Crofting was published that seeks to provide the Crofting Commission (the statutory non-departmental body in Scotland) with adequate resources to

tackle absentee crofters, ease succession plans and enable new entrants to crofting.



The waiting list for new crofts is long and streamlining these processes online could help speed up the transfer of crofting land. Securing affordable housing and strengthening community interest in rural housing issues are key to viable future rural communities, not only for crofting but for other residents and the continuation of key services such as local schools. Bolstering local interest and authority in decision-making processes surrounding crofting land could also inhibit so-called 'Green Lairds' who have the means to purchase vast swathes of land in rural communities for carbon-offsetting purposes. Finally, a growing concern around sufficient digital literacy skills could be aided by the establishment of a local 'hub' or even a university within the local area, serving as an anchor organisation to develop and preserve skills in the immediate area.



POLICY INSTRUMENTS ARE REQUIRED THAT SUPPORT THE LONG-TERM SUSTAINABILITY OF RURAL AREAS INCLUDING CROFTING REGIONS IN SCOTLAND. THESE SHOULD FOCUS ON A NUMBER OF KEY AREAS INCLUDING AFFORDABLE HOUSING, DIGITAL INFRASTRUCTURE DEVELOPMENT AND SUPPORT FOR DIGITAL SKILLS, AND INITIATIVES AND POLICIES WHICH SUPPORT THE YOUNGER-AGE POPULATION TO SETTLE AND THRIVE IN RURAL AREAS.



This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

POLICY OPTIONS

Affordable housing and crofting land

- Provision of affordable housing and crofting land, particularly for younger-age population and in-migrants wishing to contribute to the local economy will be essential to support the sustainability of rural crofting communities.

Developing digital literacies and skills

- Provision of digital skills initiatives targeted at the most remote rural places, including crofting communities, will enhance digital literacies leading to higher benefits from rural digitalisation.
- This could be done via localised rural skills hubs or university campuses in more rural areas across Scotland to increase skills development in rural regions.

Supporting younger-age population to move in to and stay in rural crofting areas

- Ongoing policy support is needed to tackle absentee crofters, ease succession plans and enable new entrants to crofting. Policy should support the demand for new crofts by streamlining the process through online channels.

Strengthening local interest in participation and decision-making processes

- Support should encourage community interest and participation in local development issues and decision-making processes relating to rural housing issues, digital infrastructural issues and the continuation of key services such as transport and schools.
- This will be key to viable future rural communities, not only for crofting but for wider local communities.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalization in the context of rural crofting communities in Scotland.

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Digitalisation in Flemish Livestock Farming

In this policy brief we set out the key issues around the digitalisation of livestock farming in the context of agri-environmental regulation and ammonia emissions.

Two scenarios were developed with a range of stakeholders in order to develop our understanding of this issue. Concerns of stakeholders are situated in the concurrent crises in the livestock farming industry. Both scenarios identified these crises, although in the positive scenario these crises functioned as a catalyst for more radical change in order to transform the livestock industry.

The main findings show that a successful future digital transformation depends to a large extent on the socio-political context of livestock farming and that a fair transformation of livestock farming is essential to ensure digitalisation will have a positive impact overall.

CONTEXT

This policy brief is based on workshops conducted in a Living Lab (LL) in Flanders as part of the EU DESIRA project. The central topic of the LL is the potential societal impact of measuring ammonia emissions on farms. Sensor technologies that are in development can give insights in the emissions that different farms produce, providing avenues to policy-makers in reducing the environmental impacts of farming.

The Flemish livestock industry deals with the environmental impacts that it produces. This is further exacerbated by the fact that Flemish livestock farms are often in close proximity to natural areas and housing.

Flanders, as a region in Belgium, has legislative powers over agriculture and environmental regulation, and sets its policies in accordance with EU directives. Ammonia emissions have been a driving factor in agri-environmental policy-making for agriculture over the past decades.

Policies have been focused on a combination of generic and individual measures targeting farmers and include the use of mitigating technologies that reduce emissions. Further policy has focused on tightening the environmental permit system for livestock farms, ensuring that farms do not excessively impact natural areas.

These policies have so far not been sufficient in lowering the emissions of ammonia. Emissions remain too high and still negatively impact natural areas in Flanders.

In response, a new policy is being drafted, seeking to further reduce the emissions of ammonia. Part of this development has been a focus on better measuring emissions through sensor technologies.

This is where this policy brief comes in, where we focus on the potential impacts of this sensor technology. As a case we used the potential role of these sensors to measure the ammonia emissions of individual farms.

To study this we have involved a range of actors in the Flemish livestock industry. Together with these actors we discussed the societal impacts of measuring ammonia emissions at farm level (rather than at the regional and national level that is currently considered).



RESEARCH APPROACH

Our research focuses on the role of digitalisation, and specifically of the sensor technology to measure ammonia emissions in the livestock farming sector in Flanders. The scenario question that was discussed with stakeholders in the course of two workshops is as follows: **"What will be the impact of digitalisation and monitoring on ammonia emissions in 2031?"**



DIGITALISATION IS ONLY ONE SMALL ASPECT TO LIVESTOCK FARMING. MORE PRESSING ISSUES TAKE PRECEDENT FOR FARMERS AND NEED TO BE ADDRESSED IN ORDER FOR DIGITAL TECHNOLOGIES TO BE BENEFICIAL.

The stakeholders involved included farmers, farmer unions, researchers, policy advisors and farm advisors.

These workshops followed the STEEP-methodology where the discussion is focused along the Social, Technological, Environmental, Economical and Political aspects connected to the impacts of this technology.

SCENARIOS DEVELOPED

Because we used the STEEP methodology, discussions automatically went much broader than just on the technology and touched on issues such as environmental policies and knowledge, as well as the broader power structure in the livestock industry.

Four different scenarios were developed including a so-called "better but not best scenario" and a "worse but not worst scenario". The first was structured around an envisaged crisis that already started to be visible in the pig farming industry. In developing opportunities for this scenario, stakeholders focused on the fact that a crisis like this would allow for radical changes in the livestock farming sector.

Radical changes would open up opportunities for fairer prices, long-term stability, a just incorporation of data-driven science and policy, and the development of a new form of agriculture and livestock farming. The incorporation of data requires a certain attention, especially concerning data ownership and data access, which were primary concerns to stakeholders.



In the second scenario, which is less optimistic, a similar crisis was identified. However, a lack of long-term vision coupled with ineffective policies leads to stagnation for the livestock farming sector. Ammonia emissions are not adequately addressed in this scenario, and digitalisation has little impacts.

In the second scenario respondents engaged more with the role of ammonia sensor technologies. The main worries of respondents was that these technologies would be forced on farmers before farmers had developed the necessary skills and knowledge to use these technologies.

Because of this, a lack of knowledge around emissions and digitalisation is a concern to stakeholders. Society is seen as ill-prepared for the introduction of big data in agriculture and farmers cannot cope with the impacts of these technologies.

POLICY RELATED DISCUSSION

Several policy options were discussed during the workshops. Due to the broad view taken in discussions, policy options went further than just about digitalization. Policies suggested by participants cover a range of possible actions that could support livestock farming.

Here are the key challenges that were identified in the workshops. These are: 1) Low farm incomes; 2) uncertainty over data ownership; 3) the dominance of large corporations in the agri-food sector; 4) the lack of scientific certainty in agri-environmental impacts; 5) the lack of long-term policy plans for agri-environmental regulation; and 6) the lack of digital skills among farmers.

In general, stakeholders desired strong government intervention in livestock farming, which was a surprise to the researchers when considering the relatively negative opinion on government policies within the livestock farming sector. These challenges also go further than a focus that is purely on digital technologies.

However, they do form the basis for the 'fair' transformation of livestock farming and are necessary to provide positive impacts of digital technology adoption.

Stakeholders in both scenario groups identified the same key themes, although they somewhat differed in the approaches they saw as beneficial to supporting farmers. These differences are mentioned in the next paragraphs when describing the suggested policies.



THE CONDITIONS FOR A SUCCESSFUL ADOPTION OF DIGITAL TECHNOLOGIES RELATED TO AGRI-ENVIRONMENTAL MEASURES DEPEND ON FAIR AND JUST AGRI-FOOD SYSTEMS.

In the positive scenario, beneficial change is set in motion through government intervention in the agri-food chain. These interventions are focused on setting fair prices that take into account costs made to

ensure environmentally friendly food production and fair prices for farm labour.

Fair prices would also provide farmers the necessary capital to invest in digital technologies and environmentally friendly practices.

Data ownership (by farmers) was seen as essential to the development and use of digital technologies. Ensuring that farmers trust digital technologies is essential and does need to be addressed according to the stakeholders.

In both scenarios a focus was made on improving the available knowledge on agri-environmental impacts. In particular, practical knowledge to farmers on how they can reduce their impacts was seen as lacking. Increased funding for scientific knowledge production would be needed in order to develop this knowledge.

Long-term agri-environmental policy that takes into account the multi-generational nature of farming is also seen as a positive change that could allow farmers to invest in digitalisation. The stability provided by this would ensure that investments could pay off to the farmer, which is seen as something that is lacking.

A last key issue are the digital skills of farmers, which are seen as lacking in the Flemish agricultural sector. Farmers will most likely struggle when adopting digital technologies. Positive change through policy can happen by providing ways for farmers to develop digital skills.





This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

POLICY OPTIONS

Fair prices

- To intervene in agri-food markets, reducing the dependency of farmers on retail in price setting.
- To set minimum prices in order to ensure that the costs of creating environmentally and socially fair food would be acceptable.
- Strong government intervention would be needed in order to push through these changes.

Data ownership

- To create regulatory frameworks ensuring data ownership by the data producer (the farmer).
- To ensure that farmers are able to see what data they share and with whom they share it.
- To ensure that this is done in a manner that allows the farmer to understand the data sharing agreements.

Agri-environmental regulation

- To create agri-environmental regulation that takes into account the multi-generational nature of farming.
- To take into account the long-term investments that farmers make by creating a stable environmental regulation that can last multiple decades without radical changes.

Digital skills & knowledge

- To create 'lighthouse farms' (exemplary farms) that are able to show other farmers how to work with digital technologies.
- To create networks around certain exemplary farms that are digitally advanced.
- To use these networks to improve the digital skills of a large group of farmers.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalization in the context of ammonia emissions in livestock farming in Flanders.

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Supply chains and local livelihoods

This policy brief provides recommendations formulated from a research project which analysed the needs, expectations and impacts of digitalisation in a rural enterprise centre which focuses on citizen-led innovations, before defining a range of future scenarios considered plausible by informed stakeholders, and studying likely effects on local livelihoods and regional resilience.

Four scenarios were developed, including the two most likely scenarios: one forecasting a positive future outlook, and the other a more negative outlook. In both cases, global supply chains are predicted to suffer a serious breakdown. In the more positive scenario this crisis is mitigated by strong local supply chains, supported by technologies such as an open source platform (openfoodnetwork.ie) which hosts a digital farmers market, and a community digital fabrication studio (FabLab), both of which generate multiple new livelihoods. In this scenario there is increased food security and a thriving local economy. In the more negative scenario, the policy focus is on global issues; funding and supports are channelled away from local initiatives. The same small enterprises that flourished in the first scenario cannot compete with corporate monopolies, leading to increased poverty, unemployment, and lack of access to essential goods and services.

These findings indicate that a policy focus on reinforcing short supply chains and infrastructure necessary to support them would greatly enhance rural resilience and boost local economies in the face of global issues caused by environmental crises and other factors.

CONTEXT

The focus of this research is a community enterprise centre located in Cloughjordan Ecovillage in North Tipperary. Since its development in 2006 the Ecovillage has brought an influx of professionals to a rural area with low population and high unemployment. It is both a community and an educational charity, with a mission to promote and model sustainable living.

The enterprise centre has embraced technological development over the past 10 years: a citizen-led digital fabrication lab (FabLab) is installed on the premises equipped with laser cutters, Computer Numeric Controlled (CNC) routers and 3D printers, and a digital studio is kitted out to host professional standard webinars and podcasts. Co-workers use online communication platforms to work remotely in a way that would not have been possible in previous decades (reducing commuting and keeping more workers based in the community). The centre also hosts a digital farmers' market through the Open Food Network platform, providing an outlet for local food producers in an area where the population is too low to support a physical

farmers market.

One of the issues which the centre seeks to address is the vulnerability of global supply chains to shocks caused by environmental, economic, political, and public health crises. This, along with the environmental impacts of long supply chains and the need to reduce emissions in the coming years, has prompted stakeholders to support the creation of local alternatives, providing local employment and strengthening the local economy as well as contributing to regional resilience. Many of the centre's activities are motivated by the need to increase the proportion of goods that can be produced locally, to build connections between local producers and consumers, and to empower citizens and encourage collaboration. Various funding streams have supported this so far, for example financing the start-up costs of the digital farmers' market.



RESEARCH APPROACH

The research aims to predict the local impacts of social, economic, technological, environmental and political changes in the next 10 years, and thereby inform policy.



PREDICTING LIKELY CHALLENGES TO LOCAL LIVELIHOODS AND REGIONAL RESILIENCE IN THE NEXT 10 YEARS IS NEEDED TO HELP INFORM POLICY.

To keep the focus specific, the research was framed around the following question: **How might a rural community enterprise centre support regional resilience in 2031, in the context of digitalisation and socio-ecological transitions?** Having first defined the needs and impacts relating to digitalisation in the local area over the last 10 years, as well as current livelihoods within the enterprise centre, we then identified 10 areas of critical uncertainty which could have considerable impact on local livelihoods and regional resilience in the next 10 years. For each of these we devised four different plausible scenarios, ranging from best case to worst case, and used the results to draft narratives to illustrate how the situation may look like in 10 years' time, and the challenges local stakeholders are likely to be facing.

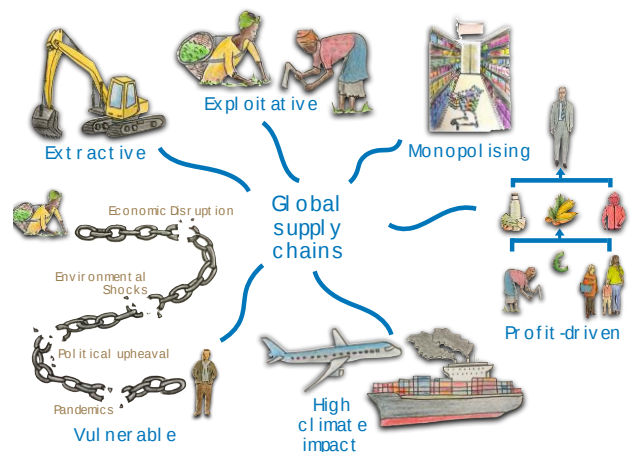
SCENARIOS DEVELOPED

The two most likely scenarios were developed in more detail, and are explained as follows: In the first scenario an energy crisis and high carbon taxes have resulted in fuel related poverty for disadvantaged groups, and greatly reduced travel to and from rural areas. Shopping is now conducted almost entirely online and virtually, and physical shops have been replaced by warehouses that distribute goods for home delivery. Meanwhile, breakdowns in global supply chains cause frequent shortages of essential items from food staples to basic materials such as paper. Local initiatives have become a necessity - the Enterprise Centre's digital farmers market is thriving and has created new livelihoods, with small businesses growing, harvesting, preparing, preserving and selling local produce. Digital fabrication now allows for local

production and repair of many goods that were previously outsourced to factories, and the FabLab provides income streams for technicians, designers and teachers.

However, as in all sectors, raw materials are often unavailable, and electricity supplies unreliable, with knock-on effects including frequent malfunctions of digital tools and cancellations of events due to power outages. All across society people have become accustomed to the 'new normal' of making do with whatever is currently available and functional.

Supply chain breakdown was considered probable across all scenarios, and in the second scenario the resultant local challenges are intensified by a policy focus on re-establishing reliable cheap imports, resulting in withdrawal of supports for local initiatives. Shopping is largely automated: Sensors routinely transmit information on stock levels from household kitchens to supermarket chains, whose algorithms generate automatic shopping lists. Platforms like the Open Food Network provide the only outlet for local producers. As local food is still more expensive than subsidised imports, low income families have struggled to afford food since supply chains went into crisis. Incentives towards a circular economy have ended built-in obsolescence, and replacement parts for many items are now 3-D printed locally. However, a well-known chain has acquired the rights to repair products from most major companies, limiting opportunities for local independent FabLabs who can't access the plans required to make parts.



POLICY RELATED DISCUSSION

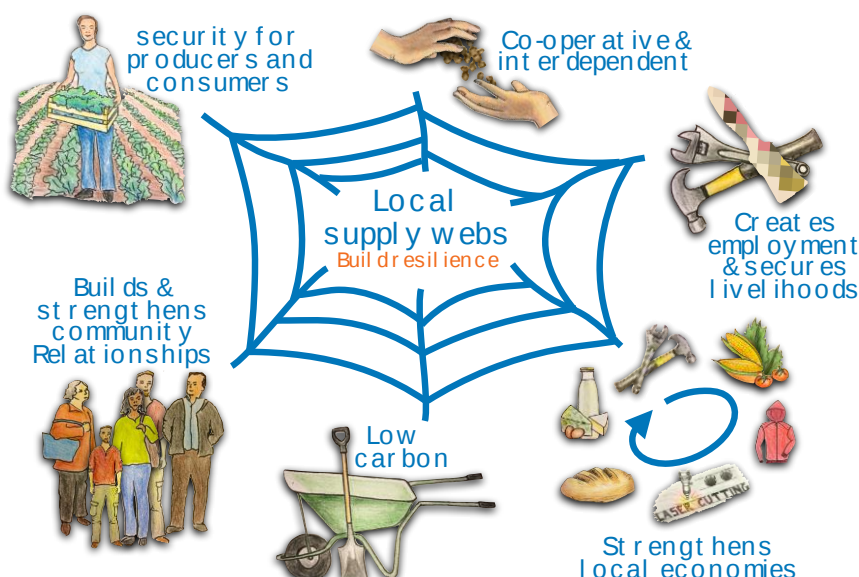
In the first scenario high carbon taxes have made travel unaffordable for rural populations, whose public transport options are at best infrequent and expensive (and often non-existent) and who become effectively isolated within their communities when rising fuel costs make private car use prohibitive. This could be mitigated by vastly improving the rural public transport network, as well as legitimising car-sharing schemes which are unsupported by the current insurance model. Fuel poverty is also a concern highlighted in the first scenario; high carbon taxes should only be introduced in tandem with supports for those with low incomes, to ensure the most vulnerable do not suffer due to rising costs of essential services such as home heating.



A FOCUS ON LOCAL, AND RURAL, IN TERMS OF BOTH TRANSPORT AND SUPPLY CHAINS, IS NEEDED TO ENSURE WE ACHIEVE A JUST TRANSITION, SECURE LIVELIHOODS, REVITALISE LOCAL ECONOMIES AND FOSTER REGIONAL RESILIENCE.

In the second scenario, the policy focus is on bailing out global supply chains. Funding is channelled away from local enterprises, which struggle to subsist, and local food is unaffordable for low income families at a time when imports are hard to come by.

When contrasting this with scenario one, in which small scale local enterprises have been supported by funding, we observe a thriving local economy, increased food security, and local resilience. This could be enhanced by adjusting subsidies: Taxing imports to reflect the true cost of production would encourage the growth of local initiatives by making local produce affordable compared to imports. Such a policy would also help to meet emissions targets by reducing global transportation of goods that could be produced locally. In scenario two, a circular economy replaces the current extract-use-dispose model when we can no longer justify the environmental costs of wasting finite raw materials and filling oceans with plastic waste. The need for this goes far beyond current trends such as reusable water bottles, to the point where all redundant machines and appliances are stripped, and used particles of gold, cobalt, plastics, and other raw materials become resources for new products. Within scenario two this vision falls short due to a corporate monopoly on the information needed to replace the component parts, which both prohibit local enterprises from entering the market, and prevent individuals from knowing how each item should be disassembled and processed at the end of life. Policies to protect Open Source sharing of knowledge and prevent monopolies of information would go a long way towards mitigating this, as well as standardising and modularising component parts.





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POLICY OPTIONS

Green Deal 2.0

- Macro EU level policy to integrate the circular, biodiversity, rural and other aspects of the previous Green Deal into a public goods driven socio-ecological policy, to subsume the Common Agricultural Policy (CAP).
- Primary focus is public goods, a people's agroecology, and the social and solidarity economy as baselines.
- End CAP payments based on historical data; initiate global reparations via debt forgiveness, agroecological investments and priority EU access.

Department of Just Transition

- Entire new government department to cope with various levels of so-called "re-ruralisation" and subsidiarity of territorialisation.

Re-nationalisation

- Public Ownership of core infrastructure on the national macro scale, especially internet and public transport assets, with transport access information fully digitalised, including work clock-ins and travel desks.

Mutual aid mandate

- Whole-of-government policy cohesion to encourage territorial level agri-food and rural synergies.
- Regulations and guidance to generate more action and traction at the micro and meso level, expressed as subsidiarity from Green Deal 2.0 down, a whole host of right-to-repair initiatives.
- Circular economy measures to be written within the framework of this policy cohesion, to enable territorial level agri-food and rural interconnectivities.

Fully homomorphic encryption

- Individual freedom amplification to allow for both privacy and navigation in a digitalised access-based socio-economy sphere, which balances community needs and individualised rights.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalization in the context of the socio-ecological transition in Cloughjordan, Co Tipperary, Ireland.

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2.2. Translated version (national language)

19 Policy Briefs were translated into the national language of the corresponding Living Lab (LL), excluding the LLs from Scotland (LL.19) and Ireland (LL.21). These Policy Briefs are compiled altogether in this Deliverable and can be consulted in this sub-section. The 19 LLs that correspond to each of the Policy Briefs are the following ones:

- LL.1. Oosterwold (NL): Local markets.
- LL.2. Central Ostrobothnia (FI): Circular economy.
- LL.3. Rhineland-Palatinate (DE): Communication and gender.
- LL.4. Rural Poland (PL): Participation.
- LL.5. Latvia (LV): Digital marketing.
- LL.6. Lake Constance (DE): Organic fruit production.
- LL.7. Austria (AT): Wood traceability.
- LL.8. North Great Plain (HU): SMEs in rural areas.
- LL.9. Switzerland (CH): Organic farming.
- LL.10 Northern Greece (GR): Smart rural communities.
- LL.11. Trikala (GR): Water management.
- LL.12. Adriatic Region (HR): Tourism.
- LL.13. Apennine Region (IT): Firewood traceability.
- LL.14. Tuscany (IT): Land management.
- LL.15. Andalusia (ES): Forest fires.
- LL.16. Aragon (ES): Rural attractiveness.
- LL.17. New Aquitaine (FR): Digital wine sector.
- LL.18. Burgundy-Franche-Comté (FR): Agroecology.
- LL.20 West Flanders (BE): Livestock production.

Toekomstscenario's voor stadlandbouw in Oosterwold

Deze brochure presenteert opties voor de realisatie van stadlandbouw en lokale voedselproductie in Oosterwold. Uitgangspunt zijn twee toekomstscenario's voor stadlandbouw in Oosterwold. De twee scenario's zijn met bewoners opgesteld, en richten zich op Oosterwold in 2030. Het eerste scenario betreft een open landschap en zelforganisatie, waar overheidsregulering beperkt is. Overschotten van lokaal geproduceerd voedsel worden via korte ketens in de stadsregio Almere afgezet. Het tweede scenario stelt een gesloten landschap en strengere overheidsregulering centraal, het kenmerkt zich door een stedelijke sfeer met dichte bebouwing in combinatie met stadlandbouw. In dit scenario is de gemeenschapsvorming rond (stads-)landbouw gefragmenteerd. Het draait met name rond enkele (professionele) producenten die teelt en afzet onderling afstemmen. Betrokkenheid van de inwoners bij de teelt en afzet is beperkt vergeleken met eerste scenario. De beleidsaanbevelingen uit beide scenario's zijn gericht op het ondersteunen van gemeenschapsvorming in/via stadlandbouw, zoals het aanstellen van groene intermediairs/experts, het starten van een centrale digitale (kennis) hub, en het bouwen van een gemeenschappelijke locatie voor opslag en verwerking.

CONTEXT

Desira Living Lab (LL) Oosterwold (figuur 1) is uniek in de Nederlandse (peri-)stedelijke planning. Dit nieuwe peri-urbane gebied van de stad Almere integreert verstedelijking en (stads-)landbouw in plaats van ze ruimtelijk te scheiden. De ambitie is zelfs dat het gebied 10% van het voedselmandje van Almere produceert. Digitale middelen zijn goed geïntegreerd in het gebied. De inwoners van Oosterwold hebben, net als in de meeste gebieden in Nederland, toegang tot snelle (glasvezel) internet. Bovendien maakt de gemeenschap van Oosterwold gebruik van platforms en apps, zoals Facebook, Instagram etc. Deze randvoorwaarden zijn belangrijk voor de gemeenschap, aangezien de bewoners van Oosterwold afhankelijk zijn van zelforganisatie en verplicht zijn op 50% van hun percelen stadlandbouw te bedrijven. Daartoe heeft de meerderheid van de gemeenschap geen achtergrond heeft in (stads-)landbouw, bestaat het risico dat hun percelen suboptimaal worden gebruikt voor voedselproductie. Digitalisering kan helpen om de uitwisseling van kennis te vergemakkelijken en wordt als belangrijk ervaren in de gemeenschapsvorming rond lokale voedselproductie en -distributie.

Binnen de gemeenschap bestaan verschillende toekomstvisies/beelden over de ontwikkeling van stadlandbouw in het gebied. Bovendien ontbreekt het aan een aansprekende route om deze toekomstvisies te verwezenlijken. Toch zijn er al enkele initiatieven en projecten rond stadlandbouw die helpen om de gemeenschap samen te brengen, richting te geven en kennis uit te wisselen.

Een voorbeeld is de voedselcoöperatie Oosterwold (www.coopoosterwold.nl).

Deze coöperatie ontwikkelt, met financiële steun van de gemeente Almere, een app voor praktische informatie over teelt, coördinatie en distributie van voedselproductie in Oosterwold. Daarnaast initieert de coöperatie de ontwikkeling van een gemeenschappelijk centrum, waar lokale groenten en fruit kunnen worden opgeslagen en verwerkt.



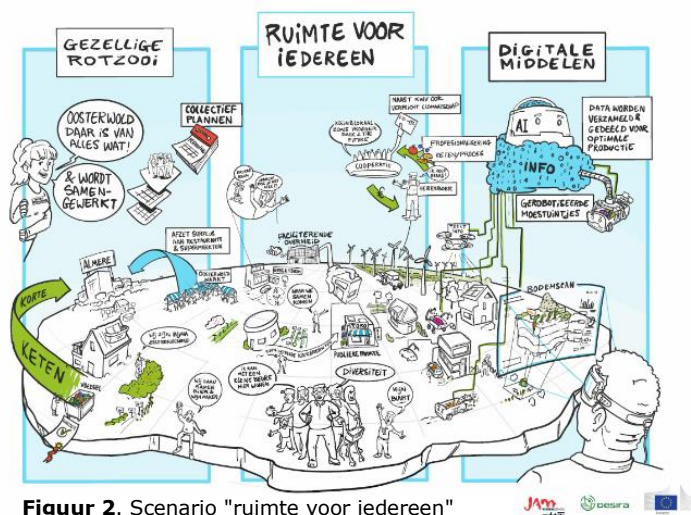
Figuur 1. Het nieuwe peri-urbane Oosterwold naast Almere, brengt stadlandbouw en 15,000 nieuwe huizen op 4,300 hectares samen.

ONDERZOEKSAANPAK

Najaar 2021 werden twee workshops gehouden waarbij gebruik werd gemaakt van een toekomstscenariomethodiek. Deze methodiek werd ingezet om creatief denken over stadslandbouw te stimuleren en de toekomstige mogelijkheden ervan bespreekbaar te maken. De workshops draaiden om de vraag: Hoe ziet de stedelijke landbouwgemeenschap van Oosterwold eruit in 2030? In de eerste workshop stonden vier mogelijke scenario's centraal die zich ontvouwd langs de twee assen: open vs gesloten landschap en faciliterende vs regulerende overheid. De deelnemers werd gevraagd om twee van deze scenario's te selecteren. Beide vormden het startpunt van de eerste workshop. De volgende drie thema's stonden centraal tijdens de uitwerking van de scenario's: 1. De rol van stadslandbouw, 2. gemeenschapsvorming en, 3. de rol van digitale technologie in de ondersteuning van stadslandbouw en gemeenschapsvorming. Door tekenaars werden de twee scenario's verbeeld, wat vervolgens weer bijdroeg aan de discussie. De tweede workshop richtte zich op zogenaamde back casting, d.w.z. het agenderen van (huidige) acties om gewenste toekomstige ontwikkelingen te realiseren. Om de discussie te stimuleren werden verschillende fictieve krantenkoppen met betrekking tot de twee scenario's gepresenteerd. Deze krantenkoppen werden getoond om de deelnemers een idee te geven van de mogelijke ontwikkelingen op weg naar de twee scenario's van Oosterwold in 2030.

DE SCENARIOS

De scenario-ontwikkeling (workshop 1) begon met het verkennen van de twee assen van mogelijke toekomstige ontwikkeling van Oosterwold: 1) zelforganisatie versus strikte regulering door autoriteiten en 2) open landschap versus gesloten (verstedelijkt) landschap. De twee scenario's die door de deelnemers werden uitgewerkt: (1) Ruimte voor iedereen (figuur 2) en (2) Manhattan met regels (figuur 3). In het eerste scenario bouwt Oosterwold voort rond een open landschap met zelforganisatie. In dit scenario is de overheidsbemoeienis beperkt. Overschotten van lokaal geproduceerd voedsel worden via (zelfgeorganiseerde) korte toeleveringsketens afgezet in de stadsregio Almere. Ter ondersteuning van de voedselproductie in Oosterwold bieden digitale technologieën de mogelijkheid tot interactie en afstemming tussen voedselaanbieders (bewoners) en gebruikers in de regio. Dit scenario is min of meer een voortzetting van de huidige ontwikkeling in Oosterwold.



Figuur 2. Scenario "ruimte voor iedereen" (beeld: Jam Visual Thinking)



Figuur 3. Scenario "Manhattan met regels" (beeld: Jam Visual Thinking)

TIJDENS DE WORKSHOPS KONDEN DE BEWONERS VAN HET LIVING LAB OOSTERWOLD DISCUSSIËREN OVER DE TOEKOMST VAN STADSLANDBOUW IN HUN GEBIED. DAARBIJ CONCENTREERDEN ZE ZICH OP HOE ZE LEVENDIGE VOEDSELGEMEENSCHAPPEN IN HET GEBIED KUNNEN CREËREN EN HOE DIGITALE MIDDELEN DAARBIJ ONDERSTEUNEND KUNNEN ZIJN.

In het tweede scenario wordt Oosterwold gevormd door een gesloten landschap met strengere overheidsregulering. Het scenario kenmerkt zich door een stedelijke sfeer met hoogbouw en dichte bebouwing in combinatie met (grote percelen professionele) stadslandbouw. In dit scenario is het een uitdaging om de nationale woningcrisis niet te ontlopen, d.w.z. de grondprijzen stijgen waardoor minder en kleinere kavels zijn om landbouw te bedrijven. Veel nieuwe bewoners hebben de voedselproductie uitbesteed aan professionals of zelfs opgegeven, desondanks wordt nog steeds 50% van het land gebruikt voor (professionele) voedselproductie. Gemeenschapsvorming rond landbouw is dus gefragmenteerd. Digitale technologie wordt door de professionals gebruikt om de voedselproductie en -afzet onderling te coördineren.

Digitale technologie wordt ook toegepast om de boeren en de bewoners van het gebied met elkaar te verbinden, bijv. door het delen van korte filmpjes over de werkzaamheden van de dag. De lokale overheid coördineert en controleert strikt de 50%-regeling; het zelforganiserende karakter van het gebied wordt daarmee losgelaten.

DISCUSSIE OVER BELEID

De deelnemers waardeerden het gesprek over de toekomst van stadslandbouw in Oosterwold tijdens de eerste workshop. De discussie tijdens de tweede workshop ging verder over hoe ze deze manier van denken over de toekomst kunnen voortzetten voor gemeenschapsvorming, stadslandbouw en digitale platforms voor uitwisselingen.

Ideeën werden verzameld over toekomstige initiatieven/beleid om 50% van het areaal voor stadslandbouw te faciliteren en wie verantwoordelijk zou moeten zijn voor deze initiatieven. De discussie liet zien dat er geen eenduidig beeld is van de toekomst van stadslandbouw in Oosterwold. Zo waren er vragen over de 10% doelstelling. De discussie maakte ook duidelijk dat de deelnemers behoefte hebben aan ondersteuning door de gemeente of een andere overkoepelende instelling/actor. Tegelijkertijd willen ze hun zelf-organiserende praktijk in stand houden. Een van de ideeën die opkwam was het aanstellen van een intermediaire actor voor stadslandbouw, een soort groene opbouwwerker. Een dergelijke actor kan actief kennis en ervaring delen met bewoners over hoe voedsel te telen en verwerken, en bewoners en initiatieven met zelfde intentie met elkaar verbinden. Bovendien zou deze persoon ook workshops kunnen geven, waar buurtbewoners elkaar ontmoeten en oplossingen met elkaar delen. Dit zou tegelijkertijd de gemeenschapsvorming stimuleren. De organisatie dan wel financiering van een dergelijke intermediair zou nog verder moeten worden uitgewerkt.

Overige ideeën die de deelnemers bespraken, onderstreepten de behoefte aan een coördinerende actor die stadslandbouw een stap verder brengt. Toen de deelnemers bespraken wie de leidende functies zou kunnen vervullen, wezen ze meestal in de richting van de gemeente maar ook naar de lokale gemeenschap. Aangezien de meeste bewoners in Oosterwold buiten de (stadslandbouw-) gemeenschap werken, is het

moeilijk om mensen te vinden die de tijd, het gezag en de middelen hebben om initiatieven te starten en te ondersteunen. Toch ontstaat er enige organisatie binnen de stadslandbouw-gemeenschap. Naast de voedselcoöperatie Oosterwold zijn dat de VoKo (een consumentencoöperatie), en Oogsterwold (een kennisplatform die trainingen verzorgt).

Deze overkoepelende initiatieven zouden ook betrokken kunnen worden bij de oprichting van een centrale locatie. Een fysieke locatie om elkaar te ontmoeten, kennis te delen, maar waar bewoners ook groenten en fruit kunnen opslaan, verwerken en vermarkten/uitwisselen. De Oosterwoldse gemeenschap zal al-dan-niet samen met de gemeente moeten investeren in een plek om deze gemeenschappelijke locatie op te zetten. Er zou iemand nodig zijn die bedreven is in het omgaan met opslag, verwerking, logistiek en die de voedselmarkt begrijpt. Zo'n functie is cruciaal en zou kunnen worden samengevoegd met die van de eerder geopperde intermediair. De vraag is echter (opnieuw) wie deze functie (financieel) moet ondersteunen. Een andere mogelijkheid is dat vrijwilligers zich verenigen om deze taak op zich te nemen.



HOEWEL OOSTERWOLD BEKEND STAAT VANWEGE DE HOGE MATE VAN ZELFORGANISATIE, ZOU ENIGE OVERKOEPELENDE ONDERSTEUNING DOOR DE GEMEENTE KUNNEN HELPEN. ONDERSTEUNING MOET ZICH RICHTEN OP (NIEUWE) INITIATIEVEN WEGWIJS MAKEN, OP HET VERSTERKEN VAN GEMEENSCHAPSVORMING OP HET GEBIED VAN VOEDSEL EN HET STIMULEREN VAN DE VOEDSELPRODUCTIE EN -VERWERKING VAN DE INWONERS VAN OOSTERWOLD. DIT ALLES ZOU OOSTERWOLD UITEINDELIJK IN DE RICHTING VAN DE 10%-DOELSTELLING KUNNEN LEIDEN.



Figuur 4. Groep tijdens de tweede workshop.



This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

BELEIDSOPTIES

Faciliteer debat

- Faciliteer gesprekken tussen bewoners en de gemeente/gebiedsteam om wederzijds begrip te creëren over wat verwacht kan worden van de bewoners op het gebied van de stadslandbouwen hoe deze verwachtingen kunnen worden waargemaakt.
- Houd workshops en bijeenkomsten, waar leden van de gemeenschap elkaar ontmoeten en samen met de gemeente het gesprek aangaan over de toekomst van stadslandbouw.

Vergroot de lokale kennis van stadslandbouw

- Een (online en interactieve) gids of handleiding voor stadslandbouw die nieuwe bewoners ondersteunt bij het plannen en afstemmen van hun voedselproductie op verschillende niveaus in hun ontwikkeling in Oosterwold.
- Organiseer intermediairs. Deze delen actief kennis met bewoners over hoe voedsel te produceren/verwerken/af te zetten en hoe voedselgemeenschappen op te bouwen.

Oprichting van een centraal digitaal hub

- De oprichting van een digitale gemeenschappelijke en interactieve ontmoetingsplaats (website, platform en/of app) om allerlei informatie over stadslandbouw, voedselproductie, voedselverkoop en -consumptie te verzamelen en te delen.
- Dit platform kan al bestaande informatiebronnen combineren met nieuwe informatie. Het platform zou ook kunnen fungeren als voedselcentrale tussen Oosterwold en de stadsregio Almere.

Ontwikkel een lokaal stadslandbouwcentrum

- Dit centrum kan beschouwd worden als een hoeksteen voor het creëren van een lokale voedselgemeenschap in Oosterwold. Het centrum is een ontmoetingsplek, een plek om kennis op te doen maar ook een plek om productente verwerken en bewaren.
- Het gemeente/gebiedsteam zou de oprichting van dit gebouw actief kunnen faciliteren (en erin investeren).

Deze beleidsnota is gepubliceerd in het kader van het door de EU gefinancierde DESIRA-project en heeft tot doel aanbevelingen te doen aan beleidsmakers over hoe de digitalisering in de context van de stadslandbouw in Oosterwold kan worden ondersteund.

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Keski-Pohjanmaan biotalous ja digitalisaatio

Biolaakson elävän laboratorion työpajassa vastattiin skenaariokysymykseen Millainen on biotalous Keski-Pohjanmaalla vuonna 2031, kun otetaan huomioon digitalisaation, kiertotalouden, energiamurroksen ja tutkimus-, kehittämis- ja innovaatiotoiminnan (TKI) edistyminen?

Tässä raportissa keskitytään kahteen skenaarioon. Parempi skenaario rakentui etätöiden edistymisen varaan. Kun yhä useammat ihmiset yhdistävät lähi- ja etätöiden, he auttavat lähentämään maaseudun ja kaupunkien elämismaailmoja. Huonompi skenaario perustuu nopeaan energiamurrokseen, jossa asukkaat "kiirehtivät sopeutumaan".

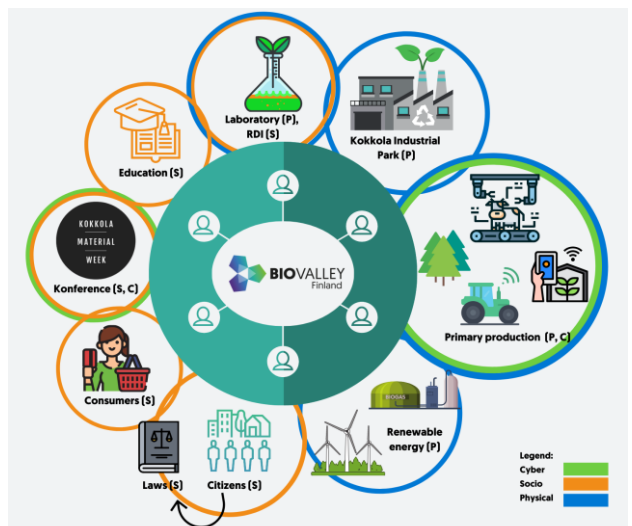
Vuonna 2031 on käytössä laaja valikoima sekä kestäviä energialähteitä (kuten fotokatalyyysi) että asumisen ja työn yhdistelmiä. Maaseudulla ei saa investoida ainoastaan ihmistyötä korvaavaan automaatioon, sillä alueilla on yhdistettävä inhimillinen luovuus ja digitaalitekniikan tarjoamat edut (AI+).

KONTEKSTI

Suomi sijoittuu yleensä korkealle kansainvälisissä vertailuissa, joissa arvioidaan kehittyneiden maiden digitalisaation tasoa. Silti digitalisaatiossa on eroja alueiden välillä ja alueiden sisällä. Maaseudun ja kaupunkien välinen digitaalinen kuilu tarkoittaa sitä, että laajakaistan ja nopeiden matkaviestinverkkojen saatavuus on paljon parempi kaupunkialueilla, joilla tarjonta tulee kaupallisilta operaattoreilta. Maaseutualueilla voi olla nopeita laajakaistayhteyksiä siellä, missä julkisia tukia on käytetty kuituverkkojen rakentamiseen.

Kokkolan teollisuuspuistossa (KIP) käytetään automatisoituja tuotantolinjoja ja robotteja. Myös suuremmilla maitotiloilla on käytössä automaattisia lypsyjärjestelmiä ja lantarobotteja, jotka helpottavat perheviljelmien töiden aikataulutusta. Metsäkorjuussa käytetään julkista paikkatietoa, joka yhdistää metsänomistajat ja alueiden puumäärät. Biovalley Finland (BF) on järjestelmien järjestelmä, mikä tekee siitä vaikeasti ymmärrettävän. BF yhdistää TKI-toimijat, yritykset, pk-yritykset, maatilat, sääntelyviranomaiset ja oppilaitokset. Kaikki BF-verkoston osat (ks. kuva 1) tunnetaan jo etukäteen, mutta vasta niiden

asettaminen vuorovaikutukseen käynnistää kehitysprosessit. Joskus BF on tarvittava katalysaattori, mutta syntymässä oleva järjestelmällä on myös ominaisuuksia, joita millään sidosryhmällä ei ole yksinään. Asioiden pitäminen erillään johtaa joko alueelliseen polkuriippuvuuteen tai tieteelliseen siiloutumiseen. Erilaisten tietopohjien (analyttinen, synteettinen ja symbolinen) yhdistäminen on eduksi, vaikka käytännössä uudet ideat löytyvätkin pilottihankkeiden ja kokeilujen kautta. Satunnaiset tapahtumat tai harvoin pidettävät viralliset kokoukset eivät riitä. Luottamus ja kyky hyväksyä uutuuksia kehittyy hitaasti.



Kuva 1. Biolaakson sosiaalinen, virtuaalinen ja fyysinen järjestelmä koostuu toiminnallisista ja alakohtaisista verkostoista.

TUTKIMUSLÄHESTYMISTAPA

Jotta Keski-Pohjanmaan biotalous kehittyisi ja menestyisi, on ennakoitava erilaisia nykytilanteesta mahdollisesti haarautuvia polkuja. Kun kuvitellaan, mitä tehdään, kun erilaiset uhat ja mahdollisuudet toteutuvat, voidaan tunnistaa, mitä resursseja tarvitaan kiireellisimmin.

Skenaariokysymys on: *Millainen on Keski-Pohjanmaan biotalous vuonna 2031, kun otetaan huomioon digitalisaation, kiertotalouden, energiamurroksen sekä tutkimuksen, kehittämisen ja innovoinnin (TKI) edistyminen.* SQ kertoo, että näihin paineisiin meidän on keskittettävä kehittämissuunnitelmaksemme.



**BIOLAAKSON ELÄVÄN LABORATORION
SKENAARIOT KESKITTYIVÄT TALOUDEN
PERUSTAAAN-PERUSTARPEET
(ENERGIA, RUOKA, ASUMINEN, TASA-
ARVO JA TIETO) ON TYYDYTTETTÄVÄ
KAIKISSA OLOSUhteissa**

Skenaariotyöpaja järjestettiin fyysisenä tapaamisena lokakuussa 2021. Kasvokkain pidettävän tapahtuman järjestäminen oli uhkapeliä, sillä osa Biolaakson kumppaneista ei tullut paikalle COVID-19-pandemiaa koskevien pelkojen vuoksi. Visioiden yhteiskehittely hyötyi menetelmällisesti ryhmätyöskentelystä.

LUODUT SKENAARIOT

Osallistujat kehittivät kaksi pääskenaariota, jotka olivat pieniä muutoksia verrattuna tavanomaiseen toimintaan ja ääritilanteisiin (utopia tai dystopia).

Etätyön pohjalta rakennettiin *"parempi muttei paras"* -skenaario. Monipaikkaiset ihmiset voivat yhdistää maaseudulla asumisen ja kaupungissa työskentelyn. Henkinen kuuluminen maaseudun ja kaupungin verkostoihin on hyvä asia, sillä se vähentää omissa kuplissa elämistä.

Etätyö antaa ihmisille mahdollisuuden valita asuinpaikkansa. Energiaa säästyy, jos ihmiset matkustavat vähemmän, mutta monipaikkaisen asumisen edellyttämä liikenne lisää kasvihuonekaasupäästöjä.

Yhteiskunnan kannalta nettovaikutus on epävarma, sillä käytännön tilanteissa voi

esiintyä monenlaisia lopputulemia.

Monimuotoinen maatalous helpottuu, jos perhe saa tuloja viljoista ja nurmesta, metsätaloudesta ja etätyöstä. Kaiken työn ei tarvitse olla kokopäiväistä ja ympärivuotista. Maaseutumatkailu voi tarjota tuloja ja kesämökkejä voidaan vuokrata erikoistuneen alustan kautta.

Energiamurrokseen perustui *"huonompi ei pahin"* -skenaario. Kylmä talvi, korkeat energian ja sähkön hinnat sekä turpeen perinteisen energiakäytön raju väheneminen ovat luoneet tunteen energiakriisistä. Kun turpeen energiakäyttö loppuu, myös kasvu- ja kuiviketurpeen tarjonta heikkenee. Ajan myötä tilalle kehitetään uusia metsistä saatavia biopohjaisia tuotteita ja biokaasun tuotannon sivutuotteita.

Uusiutuvan energian teknologioiden parantuessa toiminnan kannattavuuden kohenee ja paikalliset energiayhtiöt, yritykset ja kotitaloudet ottavat vihreää energiaa käyttöön nopeaan tahtiin. Energiamurros luo taloudellista toimintaa harvaan asutuille alueille, joilla toteutetaan hajautetun energiatuotannon hankkeita. Maanomistajat saavat tuloja vuokraamalla metsämaitaan tuulivoimaloille. Aurinkoenergiaa kerätään tuotantorakennusten katoilta. Hylätyillä turvemaidella on kosteikkoviljelmiä tai ne tuottavat nopeasti kasvavia kasveja biokaasun tuotantoa varten.

Alueen tuulivoimapotentialin hyödyntäminen ja kaivostoiminnan kasvu luovat työpaikkoja maaseudun asiantuntijoille. Maatalouden biomassaa hyödynnetään tilakohtaisissa tai useiden tilojen yhteisissä biokaasulaitoksissa. Kustannustehokkaat tilakokoluokan teknologiset ratkaisut mahdollistavat biokaasun suoramyyntin maatiloilta vähäpäästöiseen liikenteeseen. Digitaaliset alustat mahdollistavat energian, biomassojen ja muiden raaka-aineiden kysynnän ja tarjonnan yhteensovittamisen.

POLITIIKKAKESKUSTELU

Työpajan osallistajat keskittyivät ymmärtämään, mitä muutostekijät merkitsevät alueelle. Seuraavien toimintavaihtoehtojen katsotaan olevan merkityksellisiä kaikissa skenaarioissa.

Skenaariotyöpajassa listasimme teknologioiden muutoksiksi energia-alalta foto- ja termokatalyyysin (vihreän ja turkoosin vedyn tuotannon), ruokaketjusta solulihan ja vertikaalisen viljelyn, liikkumisesta sähköautot ja vakaat akkumateriaalit ja niin edelleen. Takaisin ja eteenpäin suuntautuissa aikajanoissamme huomattiin monia muutoksia myös muilla sektoreilla, mutta jatkossa tarkastelemme aluetalouden muutoksia.

Voidaan erottaa toisistaan alueiden sisällä tapahtuvat, alueiden johtamat ja alueiden välillä eroavat energiasiirtymät.

Jos käsitämme alueet muutoksen tekijöinä (poliittisen vallan ja hallinnollisten valmiuksien kautta), voimme oppia, miten vihreän ja digitaalisen teknologian luoma alueellinen kaksoismurros etenee Suomen monitasoisessa hallintojärjestelmässä.

Opitut asiat saattavat olla kontekstisidonnaisia, joten neuvojen alueiden ja valtioiden välinen siirrettävyys (edes sovellettuna) on epävarmaa. Ei pidä tarjota maailmanlaajuisesti päteviä "parhaita käytäntöjä" vaan "parhaita yhteensopivuuksia" alueille, joilla on samankaltaisia piirteitä.

Tarjontapuolella EU:n uusi rahoituskausi 2021–27 tarjoaa resursseja. Suurin vaje on kysyntäpuolella. Uusien teknologioiden käytön edistäjiä ja kaksoismuutosta tukevia asenteita on vaikea luoda. TKI-toimijat lisäävät harvaan asuttujen alueiden vastaanottokykyä uusien teknologioiden suhteen.

Alueelliset erityispiirteet vaikuttavat kaksoismuutoksen nopeuteen. Olemassa olevan fyysisen infrastruktuurin muuttaminen on kallista, koska on tehty peruuttamattomia investointeja. Laitokset ja muut uponneet kustannukset hidastavat siirtymäprosessia. Voimakkaat eturyhmät vastustavat hajautettujen uusiutuvan energian järjestelmien luomista.

Keski-Pohjanmaan toimialajakauma on suotuista muutokselle. Kokkolan

teollisuuspuiston monikansalliset yritykset tuntevat jo nyt globaalit paineet luoda ympäristöystävällisiä tuotteita ja kiertotaloutta hyödyntäviä arvoverkostoja. Esimerkiksi eräs monikansallinen yritys on valmis luopumaan polttoöljystä ja käyttämään vetyä panoksena koboltin tuotantoprosessissa.

Joillakin monikansallisilla yrityksillä on täydentävä suhde maaseutualueisiin. Esimerkiksi yritysten sivuvirtoja käytetään lannoitteina maataloudessa. Kiertotalous on hyväksi sekä kaupunki- että maaseutualueille.

Maaseudun huono-osaisuus on joskus todellisuutta. Yksi tapa päästä tästä yli on "lainata kokoa" ydinalueilta etätyön avulla. Myös yhteyksien lisääminen alueelta ulospäin voi auttaa. Hidas innovointi on mahdollista aloilla, jotka eivät ole sidoksissa muotiin tai muihin trendeihin. Biotalousmaaseutu on mahdollisuus (eikä rasite). Maaseudun ja syrjäseutujen käsitteellistäminen suhddepohjaisena ilmiönä luo toivoa.



**KAKSOISSIIRTYMÄÄ
TUETAAN PARHAITEN
YHDISTÄMÄLLÄ PITKÄN
AIKAVÄLIN SUUNNITTELUA
(PALJASTETUT EDUT) JA
UUTTA ETSIVÄ TOIMIA
(PIILEVÄT
MAHDOLLISUUDET).
POLITIikkaa TARVITAAN
EDISTÄMÄÄN PITKÄN
AIKAVÄLIN TOIMIA.**

Maaseudun pk-yritykset ja maatilat eivät ehkä osallistu kovinkaan paljon digitaalisen ja vihreän teknologian keksimiseen, mutta ne tarjoavat monia mahdollisuuksia käyttää uutta teknologiaa. Toisaalta maaseutualueiden innovaatiomuoto on useimmiten tekeminen-käyttäminen-vuorovaikutus (DUI) eikä tiede-teknologia-innovointi (STI). Maaseutu kehittyy luomalla uusia ja parempia teknologiasukupolvia (kuten maatilakokoisia biokaasun tai entistä suurempia tuulivoiman tuotantoyksiköitä), ei patentoimalla tai suunnittelemalla suoraan optimaalista tuotantoyksikköä uusimman tieteen avulla.



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POLITIIKKASUOSITUKSET

Energiamurroksen sujuvoittaminen

- Keski-Pohjanmaalla on käynnissä nopea energiamurros. Maaseudun koneurakointi on vaikeuksissa, kun turvetta ei enää käytetä energiantuotantoon. Oikeudenmukaisen siirtymän rahaston on korvattava häviäjille järjestämällä täydennyskoulutusta ja etsimällä uusia työmahdollisuuksia vähän koulutetuille työntekijöille.

Edistetään etätyötä ja monipaikkaista elämäntapaa maaseutualueiden elinvoimaisuuden säilyttämiseksi

- Maaseutupolitiikalla (matkakuluvähennyksen avulla) voidaan kannustaa ihmisiä yhdistämään lähi- ja etätyöt. Jos ihmiset yhdistävät maaseudulla asumisen ja kaupungissa työskentelyn, he osallistuvat sekä maaseudun että kaupunkien verkostoihin. Silmiä avaavan kokemuksen jälkeen alueiden ja ihmisryhmien vastakkain asettaminen vaikeutuu. Etätyön avulla voidaan epäsuorasti vähentää suvaitsemattomuutta.
- Monipaikkainen elämäntapa voi lisätä kasvihuonekaasupäästöjä enemmän kuin etätyö vähentää niitä. Uusi maaseutu-kaupunkielämäntapa on siis kompensoitava vähentämällä kasvihuonekaasuja joillakin muilla aloilla.

Maidontuotanto siirtymässä perinteestä automaatioon

- Erikoistunut maidontuotanto Keski-Pohjanmaalla muuttuu perinteestä ponnistavasta kokemusperäisestä osaamisesta tiede- ja teknologiavetoiseksi. Siirtymäpolkuja on tuettava piloteilla ja kokeiluilla.
- Fyysisen työn korvaaminen automaatiolla lisää tehokkuutta ja tuloja maaseudulla, mutta työpaikat katoavat. Pitkällä aikavälillä tarvitsemme teknologioita, jotka tukevat ihmisiä heidän pyrkimyksissään luoda uutta.

Alueen paljastunutta kilpailuetua on tuettava löytämällä uusia vahvuuksia

- Perinteiseen suunnitteluparadigmaan perustuvaa alakohtaista tai klusteripohjaista kehittämistä tarvitaan edelleen, mutta meidän on myös ennakoitava muutoksia ja otettava huomioon tulevat tarpeet.
- Luomalla ekosysteemi, jossa kaikki keskeiset yksityiset ja julkiset sidosryhmät ovat edustettuina, autetaan alueita yhdistämään nykyisiä resursseja ja luomaan jotain uutta (tuotteita tai toimialoja).

Tämä toimintapolitiittinen selvitys julkaistaan EU:n rahoittaman DESIRA-hankkeen lukuun, ja sen tarkoituksena on antaa poliittisille päättäjille suosituksia siitä, miten digitalisaatiota voidaan tukea Biolaakson (Biovalley Finland) yhteydessä.

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Digitale Verwaltungen für zukunfts-feste ländlichen Regionen

Deutschland liegt bei der Digitalisierung in den Bereichen Verwaltung und öffentliche Dienste verglichen mit anderen Ländern der EU zurück. Gleichzeitig haben Kommunalverwaltungen eine zentrale Rolle bei der Erschließung digitaler Potenziale insbesondere in ländlichen Räumen. Diese widersprüchliche Situation gilt auch für die Verbandsgemeinde Betzdorf-Gebhardshain, in der das Living Lab Rheinland-Pfalz angesiedelt ist. Ein Szenario-Workshop mit Bürger*innen und Mitarbeitenden der Verwaltung hat ergeben, dass das Onlinezugangsgesetz als Scheideweg für die zukünftige Entwicklung betrachtet wird. Das OZG verpflichtet alle Verwaltungseinheiten in Deutschland bis Ende 2022 einen wesentlichen Teil ihrer Leistungen digital anzubieten. Ein positives Szenario betont die Chancen und Möglichkeiten der Digitalisierung für das Leben in Betzdorf-Gebhardshain, während ein negatives Szenario den Fokus auf mögliche Risiken und Herausforderungen der Zukunft legt. Beide Wege verweisen auf die Bedeutung von Aspekten wie digitale Akzeptanz, Inklusion, Partizipation der Bevölkerung und den Austausch zwischen Verwaltung und Bürger*innen.

Kontext

Deutschland ist im Vergleich zu anderen Ländern der EU im Rückstand, was die Digitalisierung der Verwaltung und öffentlicher Dienste angeht (vgl. Abbildung 1). Hier soll unter anderem das Onlinezugangsgesetz (OZG) Abhilfe schaffen. Knapp 600 verschiedene Leistungen auf allen Verwaltungsebenen (Bund, Länder und Kommunen) müssen bis Ende 2022 digital angeboten werden. Insbesondere für ländliche Verwaltungen stellt das OZG eine Herausforderung dar, da deren finanzielle und personelle Ressourcen begrenzt sind. Ferner sind die technischen Infrastrukturen sehr heterogen und Prozesse aufgrund der kommunalen Selbstverwaltung nicht standardisiert. Gleichzeitig bietet die Digitalisierung vielfältige Chancen für ländliche Räume. Neben Verwaltungsleistungen im engeren Sinne bedeutet auch die Digitalisierung der Daseinsvorsorge Mehrwerte für die Bevölkerung und die lokale Wirtschaft. Die Verbandsgemeinde Betzdorf-Gebhardshain, wo sich das rheinland-pfälzische Living Lab (LL) befindet, sieht sich mit den typischen Herausforderungen vieler ländlicher Gebiete in Deutschland konfrontiert. Dazu gehören die Abwanderung junger Menschen, mangelnde Job- und Ausbildungsperspektiven oder die eingeschränkte

Versorgung mit öffentlichen Dienstleistungen.

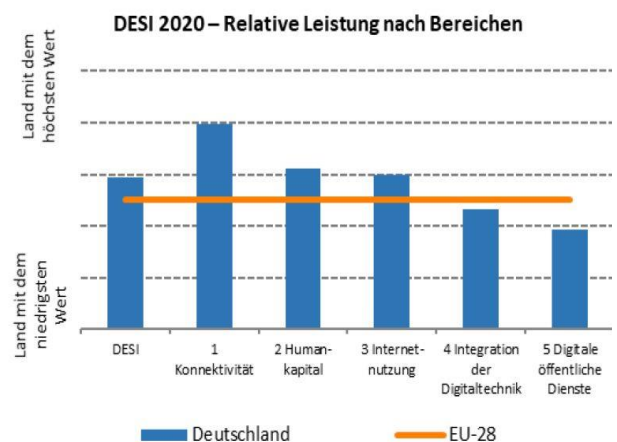


Abbildung 1. Deutschland im EU-Vergleich anhand verschiedener Digitalisierungsindikatoren.

Quelle: [DESI Länderprofil Deutschland 2020](#)

Das Living Lab befasst sich deshalb damit, wie Digitalisierung einen Beitrag zur Verbesserung der Lebensverhältnisse leisten kann. Der Schwerpunkt liegt dabei auf der Verwaltungsperspektive, da kommunale Verwaltungen eine zentrale Rolle bei der Digitalisierung ländlicher Regionen spielen. Daher nimmt das Living Lab vor allem den Austausch zwischen Kommunen, Bürger*innen, Wirtschaft und Zivilgesellschaft in den Blick. Diesbezüglich ist die Umsetzung des OZG mit Chancen wie auch Risiken verbunden.

Forschungsansatz

Digitale Kommunikationsmittel haben unseren Alltag in den letzten Jahren massiv verändert (vgl. Abbildung 1). Dies bezieht sich nicht nur auf die Art und Weise, wie wir uns informieren, sondern auch, wie wir miteinander interagieren. Jenseits des Amtsblatts verfügen Verwaltungen heute über Webseiten und sind in den sozialen Medien aktiv. Digitale Kommunikation bringt somit, wie gemeinhin angenommen, die Welt nicht nur zusammen, sondern hat auch Auswirkungen auf lokaler Ebene.



EINE DISKUSSION, WIE WIR IN ZUKUNFT (DIGITAL) ZUSAMMENLEBEN WOLLEN, IST AUF ALLEN EBENEN NOTWENDIG.

Aus dieser Erkenntnis ergab sich die Notwendigkeit, darüber zu diskutieren, wie wir in Zukunft als Gesellschaft in einer zunehmend digitalen Welt zusammenleben wollen. Dem wurde in einem Szenario-Workshop nachgegangen, bei dem folgende Frage im Mittelpunkt stand:

„Wie wird das digitale (Zusammen-) Leben in Betzdorf-Gebhardshain in 2031 aussehen?“



Abbildung 2. Szene aus dem Büro "Betzdorf digital" in der Verbandsgemeinde Betzdorf-Gebhardshain.
Copyright: Verbandsgemeinde Betzdorf-Gebhardshain.

Der Workshop folgte der Methode der Szenariotechnik. Dazu wurde im Vorfeld eine Reihe von relevanten Faktoren des Wandels definiert, darunter Aspekte wie z. B. die demografische und wirtschaftliche Struktur oder die Verbreitung und Akzeptanz digitaler Dienste. Auf dieser Grundlage wurden gemeinsam mit Bürger*innen und Verwaltungsmitarbeitenden zwei Szenarien entwickelt. Eines davon

beschreibt den Zustand nach einer positiven Entwicklung, das andere beschreibt einen Verlauf bis 2031 mit negativem Ausgang.

Entwickelte Szenarien

Im Positiv-Szenario werden die Chancen der Digitalisierung für das Leben in Betzdorf-Gebhardshain betont. Ausgangspunkt bildet die erfolgreiche Umsetzung des OZG. Aufseiten der Nutzer*innen führen innovativ gestaltete Dienste zu einer hohen Akzeptanz. Aufseiten der Lokalverwaltung steigert die Digitalisierung die Effizienz von Prozessen. Freiwerdende Kapazitäten können in die Verbesserung der Daseinsvorsorge investiert werden. Dazu gehört eine bessere medizinische Versorgung, z. B. durch Telemedizin oder Roboter in der Pflege. Aber auch das Arbeiten wird flexibler, die Menschen haben weniger Grund, in Städte abzuwandern, wovon der ländliche Raum profitiert. Insgesamt wirkt sich die Digitalisierung also positiv auf alle Lebensbereiche in der Region aus.

Im Negativ-Szenario stehen mögliche Risiken und Herausforderungen der Zukunft im Mittelpunkt: Nicht ausgeschöpfte Potenziale und Fehlentwicklungen setzen eine Abwärtsspirale in Gang, die sich auf viele Bereiche bezieht. So schlägt die Umsetzung des OZG in weiten Teilen fehl. Langfristig schränkt dies nicht nur die Möglichkeit der lokalen Verwaltung massiv ein, die Region pro-aktiv zu gestalten, auch entsteht keine digitale Akzeptanz der Bürgerinnen und Bürger. Manchen Bevölkerungsschichten fühlen sich gar ausgegrenzt, was sich letztendlich auf elementarste demokratische Beteiligungsprozesse niederschlägt. Im wirtschaftlichen Bereich setzen sich bereits heute bekannte Entwicklungen ungebrems fort: Lokale Kleinbetriebe weichen der Konkurrenz aus dem Internet, Abwanderung aufgrund mangelnder Jobperspektiven verstärkt den Fachkräftemangel, dies befördert Überalterung in der Region und Leistungen der Daseinsvorsorge schwinden.

Implikationen für die Politikgestaltung

Im Kern ist Digitalisierung zunächst ergebnisoffen und bringt sowohl Chancen wie auch Risiken mit sich. Bezogen auf die Prozesse des Austauschs in der Gemeinde kann hier beispielhaft angeführt werden, dass digitale Kommunikation potenziell zu mehr Anonymität führen kann, wenn sie persönliche Kontakte verdrängt. Andererseits ergibt sich die Möglichkeit, den Austausch zu intensivieren, indem Interaktion stattfindet, wo zuvor lediglich Informationen bereitgestellt wurden. Daraus lässt sich der Schluss ziehen, dass der Erfolg ländlicher Digitalisierung vor allem davon abhängt, wie der Prozess des Wandels gestaltet wird. Die Szenario-Workshops bieten hier Anregungen für die aktive Umsetzung:

Der Ausbau der digitalen Infrastruktur stellt eine notwendige, aber keine hinreichende Grundlage dar. Nicht alle Kommunen im ländlichen Raum sind hier so gut aufgestellt wie Betzdorf-Gebhardshain. Gleichwohl zeigt das Beispiel des Living Labs, wie kommunales Engagement in diesem Bereich zum Erfolg führen kann.



WIE KANN MAN ALLE TEILE DER BEVÖLKERUNG IN DIE DIGITALISIERUNG EINBINDEN UND DER SKEPSIS GEGENÜBER EINER DIGITALEN VERWALTUNG BEGEGNEN?

Dreh- und Angelpunkt für den zukunftsfähigen Austausch von Verwaltung und Bevölkerung ist in beiden Szenarien die erfolgreiche Umsetzung des OZG. Dabei ist die technische Komponente lediglich ein Aspekt. Der Erfolg schließt hier auch mit ein, dass sowohl der Bevölkerung als auch den Mitarbeiter*innen in den Verwaltungen durchdachte Prozesse und innovative Lösungen bereitgestellt werden. Befähigte Mitarbeiterinnen und Mitarbeiter wie auch die Akzeptanz in der Bevölkerung sind weitere Erfolgsfaktoren.

Ebenso hat sich gezeigt, dass kommunale Digitalisierung nicht bei Verwaltungsleistungen stehenbleibt. Auch der Bereich der Daseinsvorsorge ist mit konkreten Erwartungen verbunden.

Dazu gehören unter anderem die Sicherstellung der medizinischen Versorgung, eine zeitgemäße Ausstattung von Schulen und Lernenden sowie ein ÖPNV, der eine Alternative zum motorisierten Individualverkehr darstellt.

All das setzt Kommunen voraus, die in der Lage sind, Chancen der Digitalisierung für die Daseinsvorsorge zu nutzen und als moderner Dienstleister aufzutreten. Dies würde zudem dem „verstaubten“ Image der Verwaltung entgegenwirken und die Attraktivität als Arbeitgeber steigern.

Genauso notwendig ist aber auch eine Bevölkerung, die mitwirken will und kann. Dazu muss einerseits der Skepsis gegenüber einer digitalisierten Verwaltung entgegengewirkt werden, andererseits Teilhabe an Entscheidungsprozessen ermöglicht werden. Aber auch die Vermittlung von konkretem Wissen muss sichergestellt sein, z. B. wozu welche Daten vorgehalten und genutzt werden. Die Herausforderung besteht also darin, Fragen wie die folgenden zu beantworten: Wie kann man möglichst alle Teile der Bevölkerung in die Digitalisierung einbinden? Welche Austauschplattformen sind notwendig? Wie kann eine breite Verständigung ablaufen? Wie kann man die Menschen – vor allem junge Leute – dazu motivieren, sich einzubringen?

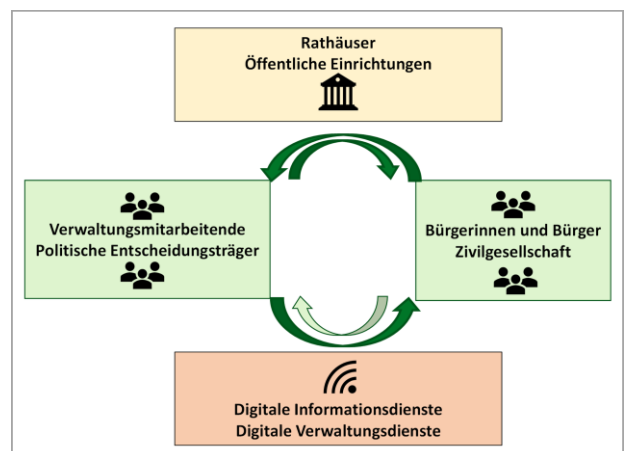


Abbildung 3. Austausch zwischen öffentlichen und privaten Akteuren – der hellgrüne Pfeil zeigt an, dass der digitale Austausch immer noch überwiegend unidirektional ist.



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OPTIONEN FÜR DIE POLITIK

Verwaltungen stärken

- Zeitgemäße technische Ausstattung sicherstellen
- Ressourcen für die erfolgsorientierte Umsetzung des OZG vorsehen.
- Allgemein ausreichendes und gut qualifiziertes Personal sicherstellen.
- Digitalisierung in der Verwaltung zu einem festen Bestandteil der Personal- und Organisationsentwicklung machen.

Beteiligung am Digitalisierungsprozess ermöglichen

- Die Bereitschaft und das Interesse der Bürgerinnen und Bürger nutzen, den digitalen Wandel mitzugestalten.
- Prozesse und Formate definieren, die die Mitbestimmung erlauben und fördern.

Bürgerinnen und Bürger befähigen

- Den Austausch zwischen Lokalpolitik und Bevölkerung sicherstellen.
- Informationen – z. B. zum OZG – zielgruppengerecht bereitstellen und Feedbackkanäle anbieten.
- Transparenz der lokalen Verwaltung fördern.
- Gegen Fake News vorgehen und Falschinformationen verhindern.
- Insbesondere auch jüngere Menschen in die politische Arbeit integrieren.

Digitale Akzeptanz in Bevölkerung und Verwaltung sicherstellen

- Gesamtgesellschaftliche, breite Verständigung zum Thema „Was wollen wir und wie wollen wir leben?“
- Durch Transparenz Offenheit der Bevölkerung fördern.
- Engagement der Menschen fördern, die sich aktiv in politische Entscheidungsfindung einbringen.

Digitale Daseinsvorsorge ausbauen

- Mobiles Arbeiten fördern.
- Anreize für Home-Office fördern, z. B. durch Zuschüsse.
- Angebote der Telemedizin ausbauen.
- Digitale Potenziale in der Bildung erschließen.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalization in the context of Rural Areas in Rhineland-Palatinate, Germany.

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Weitere Informationen unter: www.desira2020.eu

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Wdrażanie koncepcji Geodesign do planowania przestrzennego na obszarach wiejskich w Polsce

"Uwzględniając postępujący proces cyfryzacji - jak będzie wyglądało planowanie przestrzenne na obszarach wiejskich w Polsce w roku 2031?" To główne pytanie, które zostało zadane uczestnikom warsztatów zorganizowanych przez Uniwersytet Łódzki w ramach europejskiego projektu DESIRA. Niniejszy dokument przedstawia możliwe trajektorie rozwoju oraz rekomendacje w odniesieniu procesu planowania przestrzennego na poziomie lokalnym. Podczas warsztatów skupiono się na szczegółowym omówieniu dwóch scenariuszy opisujących przyszłość roku 2031. Pierwszy scenariusz, gorszy, ale nie najgorszy zakłada postęp technologiczny w zakresie planowania przestrzennego, ale brak woli i umiejętności społecznego uczestnictwa w tym procesie. Drugi, lepszy, ale nie najlepszy kreśli wizję społeczności wiejskich gotowych i chętnych do uczestnictwa w procesie planowania przestrzennego, ale niemających dostępu do odpowiednich rozwiązań technologicznych. Celem poszczególnych rozwiązań politycznych uwzględniających oba scenariusze powinno być: 1) niwelowanie luki cyfrowej między miastem a wsią; 2) podnoszenie świadomości społeczności lokalnych w zakresie planowania partycypacyjnego w kontekście cyfryzacji; 3) rozwijanie nowych kanałów cyfrowych na potrzeby konsultacji społecznych i planowania partycypacyjnego oraz 4) sprzyjanie włączeniu cyfrowemu obszarów wiejskich.

KONTEKST

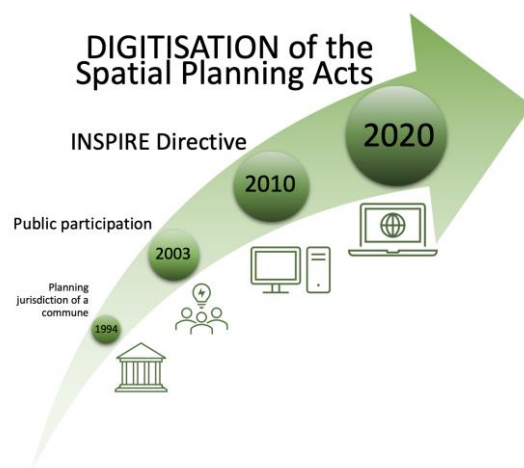
Polska jest jednym z krajów, który ze względu na swój potencjał cyfrowy może być uznany za Europejskiego Cyfrowego Challengeera. Poziom cyfryzacji w Polsce mierzony wskaźnikiem pokrycia siecią szerokopasmową, Wskaźnikiem Gotowości Sieciowej (NRI) czy Indekssem Gospodarki Cyfrowej i Społeczeństwa Cyfrowego (DESI) jest znacznie niższy niż w przypadku Cyfrowych Liderów z Europy Północnej i Zachodniej.

Najważniejszym problemem, zauważalnym w raportach DESI, jest istotna przepaść między obszarami wiejskimi a miejskimi.

Mimo to Polska ma silne podstawy, aby przyspieszyć cyfryzację swojej gospodarki. Istnieje kilka obszarów, którymi powinna zająć się Polska by mogła w pełni wykorzystać swój potencjał cyfrowy. Programy i inicjatywy, które już zostały podjęte, koncentrują się głównie na rozwoju umiejętności cyfrowych, zwiększaniu liczby specjalistów z zakresu

ICT, wspieraniu innowacji oraz zapewnianiu sprzyjającego otoczenia prawnego, politycznego i biznesowego dla inteligentnego rozwoju obszarów wiejskich.

Poniżej zaprezentowano schemat rozwoju polskiego systemu planowania przestrzennego począwszy z decentralizowanego modelu planowania po roku 1990 aż do modelu partycypacyjnego i wykorzystania w planowaniu przestrzennym technologii cyfrowych wspierających podejście GeoDesign.



PODEJŚCIE BADAWCZE

Jednym z najpoważniejszych wyzwań dla społeczności wiejskich w Polsce jest planowanie przestrzenne rozumiane jako instrument realizacji polityki przestrzennej na poziomie lokalnym. Do lat 90. XX wieku w Polsce system planowania przestrzennego opierał się na zasadach centralnego planowania. Planowanie partycypacyjne, polegające na negocjacjach i uzgodnieniach między podmiotami reprezentującymi szczebel krajowy, regionalny i lokalny, zostało wprowadzone dopiero niedawno.



**STANDARYZACJA, INTEROPERACYJNOŚĆ
I KOMPATYBILNOŚĆ DANYCH
PRZESTRZENNYCH ZAPEWNIŁY
MOŻLIWOŚĆ UDZIAŁU SPOŁECZEŃSTWA
W PROCESACH PLANOWANIA.**

Podczas dwóch warsztatów zorganizowanych pod patronatem Urzędu Marszałkowskiego przez zespół DESIRA z Uniwersytetu Łódzkiego wykorzystując metodę scenariuszową postawiliśmy przed uczestnikami spotkania następujące pytania: Jak zwiększyć uczestnictwo w planowaniu przestrzennym na obszarach wiejskich? I w jaki sposób cyfryzacja może zwiększyć zaangażowanie społeczności lokalnych w procesy planowania przestrzennego? Wykorzystując metodę scenariuszową ostatecznie sformułowane pytanie brzmiało: Jak będzie wyglądało planowanie przestrzenne na obszarach wiejskich w Polsce w 2031 roku biorąc pod uwagę postępujący proces cyfryzacji?

ANALIZA SCENARIUSZY

Aby nazwać scenariusze przyszłego rozwoju podejścia GeoDesign w planowaniu przestrzennym na obszarach wiejskich w Polsce wykorzystaliśmy nazewnictwo przycisków magnetofonowych: *play*, *pause*, *re-record*, *fast-forward*. Rozważyliśmy również możliwe konfiguracje dwóch najbardziej wpływowych czynników zmian omówionych podczas pierwszego warsztatu: 1) czynniki społeczne - koncentrujące się na poziomie umiejętności cyfrowych i chęci uczestnictwa w procesie planowania przestrzennego oraz 2) czynniki technologiczne, obejmujące różne narzędzia

dedykowane partycypacyjnemu modelowi planowania przestrzennego, tj. łączność internetową, platformy, aplikacje i ich wykorzystanie.



Dwa główne scenariusze to: "Pause: pełny zestaw narzędzi cyfrowych, ale brak uczestnictwa" oraz "Re-record: Pełne uczestnictwo, ale bez narzędzi cyfrowych". Oba scenariusze są prawdopodobne, ale opisują przyszłość, w której potrzebne jest wsparcie z zewnątrz. W pierwszym scenariuszu główny czynnik wpływu stanowi starzenie się społeczności lokalnych oraz migracja młodych ludzi. Zakłada się wysoki poziom rozwoju infrastruktury informatycznej oraz szeroki dostęp do narzędzi cyfrowych. Problemem będzie natomiast pogłębiająca się dycho- tomia między rozwojem technologicznym a percepcją społeczną oraz gotowość do zaakceptowania i wykorzystania możliwości, jakie niesie ze sobą cyfryzacja. Drugi scenariusz natomiast, opiera się na założeniu, że liczba ludności wiejskiej będzie stabilna, a infrastruktura informacyjna i narzędzia cyfrowe dobrze rozwinięte. Problemem będą natomiast zmiany technologiczne. Utrzymanie bazy informatycznej i narzędziowej będzie bardzo kosztowne, co spowoduje bardzo silną barierę dla dalszego rozwoju gmin wiejskich związaną z dostępnością nowych technologii. Przestrzeń wiejska będzie przestrzenią zróżnicowaną, coraz bardziej oddalającą się od układu przestrzennego opartego na dycho- tomii centrum-peryferie. Cyfryzacja będzie kluczowym lokalnym game changerem. Gminy wiejskie będą tworzyć mozaikę przestrzenną złożoną z różnych typów zagospodarowania cyfrowego.

MOŻLIWOŚCI ROZWOJU KONCEPCJI GEODESIGN W POLSCE

Polska cechuje się dużym zróżnicowaniem regionalnym. W kontekście rozwoju technologicznego uwidacznia się ono znacznie w układzie centrum-peryferie. W centrach przeważa charakter miejski (duże miasta i strefy bezpośredniego oddziaływania w postaci miejskich regionów funkcjonalnych), a na peryferiach przeważają obszary wiejskie. Określenie podstawowych trendów prowadzących do utrwalenia osiągnięć technologicznych i przejścia w kierunku powszechnej cyfryzacji musi uwzględniać bariery społeczne, a także odnosić się do kwestii demograficznych (starzenia się społeczeństwa) oraz psychologicznych (oporu wobec zmian).



ROSNAĆCA ŚWIADOMOŚĆ ISTOTY I ZNACZENIA PLANOWANIA PRZESTRZENNEGO W POPRAWIE JAKOŚCI ŻYCIA PROWADZI DO ZAINTERESOWANIA PROJEKTAMI OPARTYMI NA KONCEPCJI GEODESIGN, A TO Z KOLEI PROWADZI DO ZWIĘKSZENIA UMIEJĘTNOŚCI CYFROWYCH.

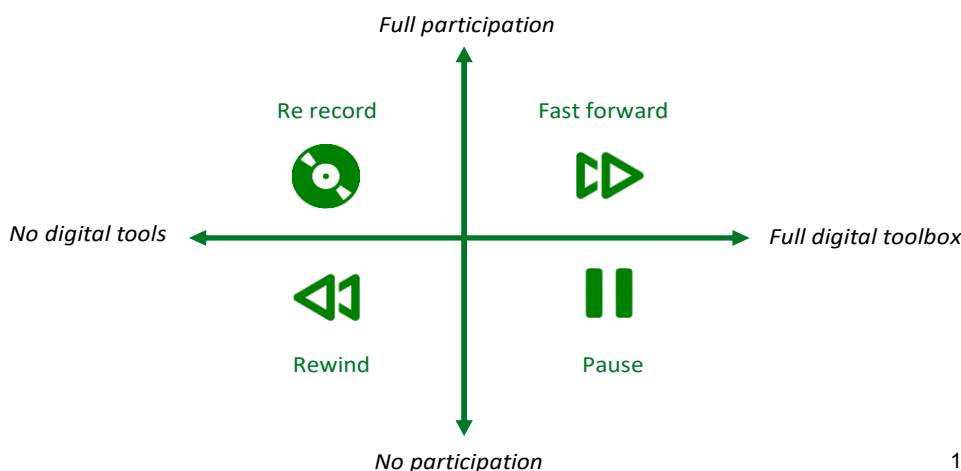
Główne wyzwanie stanowić będzie przyspieszenie społecznego procesu adaptacji do zmian technologicznych poprzez przekonanie społeczności lokalnych o korzyściach płynących z cyfryzacji. Przewiduje się, że dualizm społeczny może mieć konsekwencje przestrzenne oraz przekształcić się w dualizm terytorialny, tzn. z dobrodziejstw cyfryzacji będą korzystały społeczności dobrze wykształcone, o większym potencjale działania, natomiast silnie wyludnione, odległe obszary wiejskie, ze

względem na słabnący potencjał społeczny, mogą "przegapić swoją szansę".

Gminy wiejskie, które osiągną odpowiednio wysoki poziom rozwoju, wejdą na ścieżkę zrównoważonej polityki przestrzennej. Gminy, które nie skorzystają z tych możliwości, pogrążą się w chaosie planistycznym, spowodowanym konfliktami społecznymi i brakiem umiejętności wykorzystania narzędzi cyfrowych do ich rozwiązywania.

Połączenie nowych możliwości powszechnego i swobodnego udostępniania informacji przestrzennej z zaangażowaniem społeczności lokalnych jest motorem idei GeoDesign i powinno być celem władz lokalnych. Koncepcja GeoDesign zakłada, że dzięki bardziej zintegrowanym narzędziom pozyskiwania, analizy i wizualizacji danych przestrzennych (także w formacie 3D), możliwe jest jednocześnie zaprojektowanie kilku alternatywnych koncepcji zagospodarowania terenu, które będą oceniane zarówno przez specjalistów, jak i członków społeczności lokalnych. W efekcie o ostatecznym kształcie projektu nie decyduje już projektant czy grupa decydentów, ale całe społeczeństwo.

W celu wsparcia procesu cyfryzacji i przeciwdziałania wykluczeniu cyfrowemu podjęto już wiele działań. Aczkolwiek zakres w jakim będą one miały wpływ na rozwój obszarów wiejskich zależy od ich realizacji, gdyż cyfryzacja obszarów wiejskich nie była dotychczas przedmiotem zainteresowania rządu, a informacji na temat badań lub polityki dotyczącej bezpośrednio obszarów wiejskich jest wciąż stosunkowo niewiele.





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REKOMENDACJE W ZAKRESIE ROZWOJU POLITYKI DOT. CYFRYZACJI W POLSCE

Niwelowanie różnic w dostępie do technologii cyfrowych między miastem a wsią

- Należy zwrócić uwagę na peryferyjnie położone obszary wiejskie, gdzie prędkość połączeń jest stosunkowo niższa i dostęp do łącz szerokopasmowych jest niewielki w porównaniu z obszarami miejskimi i podmiejskimi.

Zwiększanie świadomości społeczności lokalnych w zakresie planowania partycypacyjnego w kontekście cyfryzacji

- Zasadniczą kwestią powinno być usprawnienie społecznego procesu adaptacji do zmian technologicznych poprzez uświadomienie społecznościom lokalnym korzyści płynących z cyfryzacji w zakresie możliwości zrozumienia, kontroli i zmiany zagospodarowania przestrzennego i zarządzania gruntami.

Rozwijanie nowych kanałów cyfrowych na potrzeby konsultacji społecznych i planowania partycypacyjnego

- Do 2020 r. w Polsce nie obowiązywały przepisy wskazujące na konieczność tworzenia danych GIS na potrzeby dokumentów planistycznych. Od 31 października 2020 r. nowe przepisy nakładają na organy odpowiedzialne za akty planowania przestrzennego obowiązek tworzenia zbiorów danych GIS. Obowiązek ten dotyczy również aktów już obowiązujących. Nadal jednak niewiele obszarów wiejskich dysponuje narzędziami cyfrowymi wykorzystywanymi w planowaniu partycypacyjnym (geokwestionariusze; geodyskusje) lub angażuje media społecznościowe w proces planowania.

Sprzysianie procesowi włączenia cyfrowego

- Zaleca się przeformułowanie obecnych strategii ogólnych dotyczących transformacji cyfrowej kraju, tak aby jak najlepiej odpowiadały one potrzebom słabszych grup społecznych oraz regionów wiejskich (zwłaszcza tych położonych na obszarach peryferyjnych), zapewniając im dostęp do technologii cyfrowych i wspierając rozwój umiejętności cyfrowych społeczności lokalnych.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalization in the context of Geodesign in Rural Poland.

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Gaļas liellopu audzētāji un digitālais mārketinga

Latvijas augstvērtīgās liellopu gaļas nozare ir piedzīvojusi būtiskas strukturālas pārmaiņas (eksporta pieaugums, tiešās tirdzniecības pieaugošā nozīme, izveidoti izsoļu nami u.c.), izmaiņas patērētāju vēlmēs un kontekstuālus sociāli ekonomiskus un politiskus satricinājumus. Tomēr divi galvenie izaicinājumi ir iedzīvotāju skaita samazināšanās un patērētāju nevēlēšanās maksāt par augstas kvalitātes produktiem. Lai atrisinātu šos sarežģījumus, Dzīvās prakses laboratorijas (*Living Lab - LL*) Latvijā meklē veidus, kā digitālos rīkus varētu izmantot tiešai saziņai ar patērētājiem. Digitālie risinājumi varētu palīdzēt gaļas audzētājiem izplatīt informāciju par liellopu audzēšanas pozitīvo sociālo ietekmi un ierobežoto ietekmi uz vidi Latvijā, kā arī Latvijas lauksaimnieku saražotās liellopu gaļas augsto kvalitāti.

LL ietvaros 2021. gada augustā notika nākotnes scenāriju plānošanas seminārs. Semināra laikā tika izvirzīts scenārija jautājums, fokusējoties uz iespējamo situāciju 2031. gadā: "Kā izmantot digitālā mārketinga potenciālu, lai pārdotu liellopu gaļu?" Semināra laikā tika izstrādāti divi scenāriji: "Apburtais loks" (scenārijs, kas ietver daudzas iespējas, bet vienlaikus arī ievērojamas neskaidrības par potenciālajiem Latvijas lauksaimnieku saražotās liellopu gaļas noieta tirgiem) un "Iespiežoties nišās" (scenārijs, kas uzsver, ka gaļas audzētājiem aktīvi jārīkojas, ja viņi vēlas būt aktuāli arī turpmāk).

Lauksaimnieki ir izveidojuši kanālus saziņai ar patērētājiem. Tomēr šos kanālus bieži nevar paplašināt, to uzlabošanai nepieciešamas plašākas strukturālas izmaiņas.

KONTEKSTS

DESIRA Dzīvās prakses laboratorijas (*Living lab - LL*) Latvijā mērķis ir, izmantojot digitālos rīkus, izstrādāt inovatīvu atbalsta sistēmu liellopu gaļas atpazīšanai un izsekojamībai, lai uzlabotu un paplašinātu Latvijas liellopu audzētāju tirgu. Konkrēti, LL pievērsās digitālā mārketinga stratēģijai, kā mērķis ir informēt patērētājus un lauksaimniekus par Latvijas liellopu gaļas īpašībām un kvalitatīvas liellopu gaļas augstās cenas iemesliem.

Liellopu gaļas tirgum Latvijā ir daudz īpašību, kas padara to interesantu LL pieejams izmantošanai. Lai gan Latvijas zemnieki var saražot ievērojamu daudzumu bioloģiskās liellopu gaļas, tikai neliela daļa patērētāju ir gatavi maksāt par kvalitatīvu liellopu gaļu. Digitālie risinājumi varētu palīdzēt gaļas audzētājiem izplatīt informāciju par liellopu audzēšanas pozitīvo sociālo ietekmi un ierobežoto ietekmi uz vidi Latvijā, kā arī Latvijas lauksaimnieku saražotās liellopu gaļas augsto kvalitāti.

Digitālie rīki palīdzēs sasniegt tos patērētājus, kuri vēlas maksāt par augstas kvalitātes produktiem ar zemu ietekmi uz vidi. Šo grupu nav vienkārši sasniegt, izmantojot tradicionālās mārketinga metodes.

Nozarē ir notikušas būtiskas strukturālas pārmaiņas (eksporta pieaugums, tiešās tirdzniecības pieaugošā nozīme, izveidoti izsoļu nami u.c.), izmaiņas patērētāju vēlmēs un kontekstuāli sociāli ekonomiski un politiski satricinājumi. Vietējais tirgus ir samazinājies. To ir ietekmējusi iedzīvotāju skaita samazināšanās no vienas puses, un uztura izvēļu maiņa no otras puses. Pēdējo divu desmitgažu laikā Latvijā uz vienu mājsaimniecības locekli gadā vidējais liellopu gaļas patēriņš ir samazinājies uz pusi. Šajā nelabvēlīgajā kontekstā daži audzētāji ir mēģinājuši pārdot savus produktus vietējā tirgū. Ievērojamākā gaļas liellopu audzētāju organizācija ir Gaļas liellopu audzētāju biedrība, kurā ir 265 biedri.

PĒTNIECISKĀ PIEEJA

2021. gada augustā notika nākotnes scenāriju veidošanas seminārs. Semināra laikā tika apspriests šāds scenārija jautājums: "Kā izmantot digitālā mārketinga potenciālu liellopu gaļas pārdošanai?". Pirms semināra un tā laikā tika izstrādāti divi gadījumam specifiski scenāriji un divi vispārīgi scenāriji, kas apraksta labāko un sliktāko iespējamo situāciju. Lai izstrādātu divus gadījumam raksturīgus scenārijus, mēs noteicām sarakstu ar (pārmaiņu) faktoriem, kas ietekmē procesus.



LAI GŪTU LABUMU NO DIGITĀLAJĒM RĪKIEM, MAZĀM AUGSTAS KVALITĀTES LIELLOPU GAĻAS SAIMNIECĪBĀM BŪS JĀSADARBOJAS. SADARBĪBA PALĪDZĒS UZKRĀT RESURSUS, KAS NEPIECIEŠAMI SAREŽĢĪTU RISINĀJUMU IZSTRĀDEI.

Ietekmējošo faktoru saraksts, kas izmantots, lai raksturotu divus gadījumam specifiskus scenārijus, tika izstrādāts, identificējot vienu vai divus ietekmējošos faktorus katrā no šīm jomām: sociālie, tehnoloģiskie, vides, ekonomikas, politikas. Scenāriju izstrādei tika izmantoti šādi ietekmējošie faktori: (1) jaunas diētas; (2) dzīvnieku labturība; (3) sociālie mediji un sociālie tīkli; (4) ekstremāli laikapstākļi; (5) liellopu slimību izplatība; (6) iedzīvotāju maksātspēja; (7) atbalsts videi draudzīgai praksei.

Par katru ietekmējošo faktoru izteikti divi ziņojumi. Scenāriju ietvaru ziņojumi izstrādāti iteratīvā procesā. Ziņojumu kopas, kas apraksta ar ietekmējošos faktoru radītās pārmaiņas, tika izmantotas kā pamats diviem gadījumam specifiskiem scenārijiem. Ziņojumi tika atlasīti, paturot prātā, ka savstarpēji saistītiem jaunajiem scenārijiem jābūt ticamiem, vienlaikus nodrošinot, ka neviens no scenārijiem automātiski nešķiet ievērojami vēlamāks vai iespējamāks. Tā vietā katrā scenārijā dažas vēlamas izmaiņas tika papildinātas ar izmaiņām, kas ražotājiem rada jaunus izaicinājumus.

IZSTRĀDĀTIE SCENĀRIJI

Semināra laikā dalībnieki pirmo scenāriju nosauca "Apburtais loks". Šis scenārijs paver virkni iespēju, tomēr dalībnieki atzīmēja, ka tajā pastāv ievērojama neskaidrība par Latvijas lauksaimnieku ražotās liellopu gaļas tirgu. Citiem vārdiem sakot, dalībnieki svārstījās starp Latviju kā galveno tirgu un eksporta ceļu. Otrajam scenārijam tika dots nosaukums "Iespraucoties nišās". Dalībnieki norādīja, ka augstas kvalitātes liellopu gaļas audzētājiem būtu aktīvi jārikojas, ja viņi vēlas gūt labumu no šīs nākotnes. Otrajā scenārijā paredzētais izaicinājums ir tas, ka, šķiet, ka nav dabiska tirgus, no kura augstas kvalitātes lauksaimnieki varētu gūt labumu. Tomēr, no otras puses, patērētāji kopumā vairāk interesējas par nišas produktiem un var maksāt par augstas kvalitātes produktiem.

Scenāriji ilustrē vairākus izaicinājumus, ar kuriem saskaras nozare – tostarp patērētāju uzticības trūkumu, sarūkošos dabīgos tirgus (negatīvs iedzīvotāju skaita pieaugums Latvijā) un ierobežotu pieprasījumu pēc augstas kvalitātes liellopu gaļas, mainīgus uztura paradumus un lauksaimnieku nevēlēšanos sadarboties. Spēja skaidri un pievilcīgi komunicēt par Latvijas liellopu gaļas vērtību un īpašībām var palīdzēt pārvarēt šos izaicinājumus. Lauksaimniekiem ir jāpārdefinē liellopu audzēšana kā ainavas neatņemama sastāvdaļa un jāklieš maldīgie priekšstati par liellopu gaļas ražošanu Latvijā. Tāpat lauksaimniekiem jānodrošina patērētāji uzzināt vairāk par produktiem un dažādiem to pagatavošanas veidiem. Digitālie rīki piedāvā jaunus mārketinga risinājumus, kas ļaus lauksaimniekiem nostiprināt savas pozīcijas tirgū. Veiksmīga sadarbība var palīdzēt lauksaimniekiem pilnībā gūt labumu no šiem rīkiem.



AR POLITIKU SAISTĪTA DISKUSIJA

Semināra diskusijas atklāja, ka ir skaidras problēmas, kuru risināšanā nozare un politikas veidotāji varētu iesaistīties, lai uzlabotu nozaru sniegumu:

Liellopu gaļa, ko ražo, ievērojot augstas kvalitātes liellopu gaļas ražošanas praksi, ir dārgāka nekā parastā gaļa. Liellopu gaļas izmaksas ir saistītas ar bioloģiskās lauksaimniecības praksi un izvēli strādāt ar pļavās un ganībās audzētiem lopiem. Tomēr patērētāji ir vāji informēti par gaļas kvalitātes aspektiem un viņiem ir ierobežotas dažādu gaļas gabalu pagatavošanas prasmes. Līdz ar to ražotājiem ir grūti attaisnot cenas, kas būtu ievērojami augstākas nekā parasto gaļu. Apzinoties šo problēmu, individuālie ražotāji un ražotāju grupas ir sākušas sadarboties ar patērētājiem, mēģinot informēt par dažādām receptēm un skaidrot, kas ir kvalitatīva liellopu gaļas ražošana. Tomēr politiska izvēle varētu būt papildu spiediens uz saimniecībām, kas ievēro parasto praksi, tādējādi veicinot cenu pieaugumu visiem gaļas produktiem.

Ja liellopu gaļas ražotāji atrodas laukos un bieži vien diezgan tālu no lielajām pilsētām, tad galvenie patērētāji (tie, kas spēj piemaksāt par labāku produktu) dzīvo pilsētās. Tas sarežģī loģistiku. Lielākā daļa lauksaimnieku ir ieviesuši kādu digitālās pasūtīšanas sistēmas veidu (sākot no mazāk izsmalcinātām WhatsApp tērzēšanas vai Google izklājlappēm līdz pilnībā funkcionējošiem tiešsaistes veikaliem). Tomēr šos veidus var būt grūti paplašināt un neiespējami saistīt ar citām sistēmām, kas, piemēram, dokumentē pašlaik noliktavā esošos produktus.

Turklāt attālums starp saimniecību un patērētājiem palielina piegādes izmaksas un piegādes ekoloģisko pēdu. Šīs izmaksas varētu samazināt, ja lauksaimnieki sadarbotos, plānojot piegādes. Jau tagad ir lauksaimnieku grupas, kas cenšas izveidot kopīgu loģistikas plānošanu, ļaujot lauksaimniekiem strādāt tikai ar patērētājiem, kas atrodas tuvāk

saimniecībai, vienlaikus nezaudējot peļņu. Loģistikas plānošanas atbalsta rīku izstrāde varētu būt noderīgs instruments citiem mazajiem lauksaimniekiem, kuri meklē veidu, kā samazināt piegādes izmaksas.



SAZIŅA AR PATĒRĒTĀJIEM NEBEIDZAS AR BRĪDI, KAD LAUKSAIMNIEKU VĒSTĪJUMS SASNIEDZ PATĒRĒTĀJUS. KOMUNIKĀCIJA JĀPAPILDINA AR STRUKTURĀLĀM IZMAIŅĀM, LAI NOZARE DARBOTOS EFEKTĪVI.

Lai lauksaimnieki varētu sadarboties kopīgas loģistikas jomā (kas ietvertu kopīgu tīmekļa vietni produkta pārdošanai un kopīgai loģistikai), viņiem jānodrošina, ka visās iesaistītajās saimniecībās produkti saglabā vienāda līmeņa kvalitāti. Tam nepieciešams izstrādāt kvalitātes standartus un noslēgt līgumus par galvenajiem tirgotajiem produktiem. Šai standartizācijai, visticamāk, ir jānāk no lauksaimniekiem, un politikas veidotāji to nevar ieviest. Tomēr lauksaimniekiem nav viegli to izdarīt.





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POLITIKAS IESPĒJAS

Digitālo prasmju attīstīšana

- Lauksaimnieki piekrīt, ka viņiem jānodrošina, lai viņu saimniecības būtu "tiešsaistē", piem. izmantojot sociālos medijus, izveidojot mājaslapu utt. Tomēr daudzi lauksaimnieki pārstāv paaudzes, kuras ar digitālajiem rīkiem iepazīstinātas vēl. Lai arī dažiem no viņiem saziņa tiešsaistē grūtības nesagādā, citi sūdzas, ka šis uzdevums aizņem nesamērīgi daudz laika un rada stresu.
- Dažiem no šiem lauksaimniekiem noderētu apmācības, kas palīdz uzlabot prasmes. Tomēr citi dotu priekšroku, specializēto uzņēmumu pakalpojumiem, kas nodrošinātu šos pakalpojumus, lai lauksaimniekiem šīs prasmes nebūtu vajadzīgas.

Izsekojamības pārdomāšana

- Ir ieviesta sistēma, kas ļauj patērētājiem izsekot iegādātajiem gaļas produktiem. Šādu sistēmu uztur valsts, un tās pamatā ir dati, kas saimniecībām jādeklarē uzraudzības organizācijām.
- Diemžēl esošais risinājums nav lietotājam draudzīgs un vien daži patērētāji par to ir informēti. Ja sistēma tiktu uzlabota, padarot to lietošanai draudzīgāku, tā varētu palīdzēt lauksaimniekiem sazināties ar patērētājiem.

Pievēršanās kontekstam

- Nozare norisinās pārstrukturēšanās. Šobrīd tiek veidoti vismaz divi lauksaimnieku kooperatīvi. Lauksaimnieki mobilizējas, lai paši atrisinātu nozares problēmas. Lai viņus atbalstītu, politikas veidotājiem jārisina ar kontekstu saistītie jautājumi.
- Vairākas no galvenajām problēmām, ar kurām saskaras lauksaimnieki, nav saistītas ar nozares īpatnībām. Tā vietā tās sakņojas kontekstuālos procesos, kas ietekmē arī citas lauksaimniecības nozares.
- Kontekstuālajās problēmas ietver negatīvu iedzīvotāju skaita pieaugumu, patērētāju jutīgumu pret cenām, būtiskas cenu atšķirības starp tradicionālajiem un atbildīgi ražotajiem produktiem. Strādājot ar šiem izaicinājumiem, politikas veidotājiem jāieņem stingrāka nostāja.

Šis politikas pārskats ir publicēts ES finansētā DESIRA projekta ietvaros, un tā mērķis ir sniegt ieteikumus politikas veidotājiem par to, kā atbalstīt digitālā mārketinga izmantošanu gaļas liellopu audzētāju saimniecībās Latvijā.

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Digitalisierung der Obstproduktion in Deutschland

Dieses Kurzdossier stellt die Ergebnisse von Stakeholder-Interviews und Workshops vor, die im Living Lab (LL) der Bodenseeregion durchgeführt wurden. Die Leitfrage dieses LL war **"Wie kann die Digitalisierung zu einer nachhaltigen Obstproduktion bis 2031 beitragen?"**. In diesem Zusammenhang wurden zwei Szenarien erarbeitet. Das "Besser, aber nicht das Beste"-Szenario (BnB) geht von einer hohen Verfügbarkeit, Akzeptanz und Umsetzung digitaler Obstproduktionstechnologien mit positiven sozioökonomischen Auswirkungen, aber geringen ökologischen Verbesserungen aus. Das Szenario "Schlecht, aber nicht das Schlechteste" (WnW) geht von einer geringen Verfügbarkeit, Akzeptanz und Umsetzung digitaler Obstproduktionstechnologien mit negativen sozioökonomischen Auswirkungen und ökologischen Vorteilen aus. Vier politische Maßnahmen, die erforderlich sind, um die Potenziale der Digitalisierung zur nachhaltigen Entwicklung im Obstbau zu nutzen, wurden identifiziert: (1) Ganzheitliche und unabhängige Bewertung von digitalen Einzel- und Gesamtlösungen, (2) Verbesserung der Anwendbarkeit und Bezahlbarkeit von digitalen Lösungen in Familienbetrieben, (3) Entwicklung eines rechtlichen Rahmens zur Regelung der Datensicherheit und Datenhoheit, (4) Ausbau der digitalen Infrastruktur in ländlichen Gebieten und (5) Förderung der digitalen Kompetenzen.

KONTEXT

Das beliebteste Obst der deutschen Verbraucher ist der Apfel. Jeder vierte in Deutschland konsumierte Apfel stammt aus der Bodenseeregion. Sie ist eines der größten Obstanbaugebiete in Deutschland. Die Verbraucher wünschen sich qualitativ hochwertige und gesunde Äpfel. Sie sollen immer gleich aussehen und ganzjährig erntefrisch verfügbar sein. Gleichzeitig sollen sie preiswert, umweltfreundlich und regional produziert sein. Aufgrund dieser unterschiedlichen Verbraucherwünsche stehen die Obstbau-Familienbetriebe in der Bodenseeregion vor ökologischen, sozio-ökonomischen und strukturellen Herausforderungen. Die größten sind die Verfügbarkeit verlässlicher und billiger Saisonarbeitskräfte, die Notwendigkeit, Pestizide zu reduzieren und die Artenvielfalt zu erhalten, sowie Wetterextreme durch den Klimawandel. Diese Herausforderungen setzen die Familienbetriebe unter Druck, ihre derzeitigen Praktiken anzupassen. Die Digitalisierung gilt als vielversprechende Entwicklung zur Bewältigung dieser Herausforderungen. Unter anderem werden autonom fahrende Traktoren, Sprühdrohnen und Obsternteroboter auf ihre Anwendbarkeit getestet. Die aktuellen Hauptbedürfnisse, die das Living Lab (LL)

Bodensee identifiziert hat, lassen sich wie folgt zusammenfassen:

1. Nachhaltigkeit und Regionalität in der Obstproduktion durch Digitalisierung.
2. Entwicklung von Gesetzen und Normen für eine kompatible, zuverlässige und sichere Verwaltung und Speicherung sensibler Daten und Informationen unter Beachtung der Eigentumsrechte.
3. Verbesserung des Zugangs zu einfach zu bedienenden und bezahlbaren Technologien für eine automatisierte und präzise Verwaltung und Überwachung des Obstanbaus für Familienbetriebe.
4. Ausbau und Verbesserung der Infrastruktur für einen hochwertigen Datenzugang in ländlichen Gebieten.
5. Förderung der digitalen Kompetenz und der lebenslangen digitalen Bildung für Obstbaubetriebe und ihre Berater.

Die wichtigsten politischen Maßnahmen, die im LL Bodensee identifiziert wurden, um diese Ziele zu erreichen, sind (1) Unterstützung der Entwicklung digitaler Technologien, die für Familienbetriebe anpassbar und anwendbar sind, und (2) Stärkung digitaler Infrastruktur und Kompetenzen für eine nachhaltige, faire und bezahlbare regionale Obstproduktion durch Familienbetriebe.

FORSCHUNGSANSATZ

Ziel des LL Bodensee war es, mögliche Entwicklungen im nächsten Jahrzehnt zu antizipieren. Der Schwerpunkt lag auf unterschiedlichen Transformationspfaden, welche die Erwartungen, Bedenken und Kenntnisse von Interessenvertretern und Entscheidungsträgern integrieren und Denk- und Diskussionsanstöße anbieten.



DER LL BODENSEE ZEIGT, WIE DIE DIGITALISIERUNG DIE REGIONALE OBSTPRODUKTION VON FAMILIENBETRIEBEN IN DEN NÄCHSTEN ZEHN JAHREN VERÄNDERN KANN.

Das LL Bodensee führte im November 2021 einen Online-Szenario-Workshop durch. Dort wurden Treiber des digitalen Wandels und verschiedene Zukunftspfade identifiziert und Narrative für unterschiedliche Szenarien entwickelt. Die Szenario-Leitfrage der Narrative war: *Wie kann die Digitalisierung zu einer nachhaltigen Obstproduktion bis 2031 beitragen?* Die Workshop-Teilnehmer identifizierten zwei Hauptszenarien, die durch unterschiedlich plausible Entwicklungen der sozioökonomischen, ökologischen, politischen und technologischen Einflussfaktoren gekennzeichnet sind. Zudem wurden zwei extreme Szenarien, die sich einerseits auf "utopische" und andererseits "dystopische" Visionen beziehen, entworfen.

ENTWICKELTE SZENARIEN

Die Workshop-Teilnehmer erarbeiteten Szenario-Narrative auf der Grundlage von zwei Zwischenszenarien. Dazu gehörte das "Besser, aber nicht das Beste"-Szenario (BnB), das eine hohe Verfügbarkeit, Akzeptanz und Implementierung digitaler Obstproduktionstechnologien mit positiven sozioökonomischen Auswirkungen, aber ökologischen Nachteilen berücksichtigt. Das Szenario "Schlechter, aber nicht das Schlechteste" (WnW) geht von einer geringen Verfügbarkeit, Akzeptanz und Umsetzung digitaler Obstproduktionstechnologien mit negativen sozioökonomischen Auswirkungen und ökologischen Vorteilen aus.



Im BnB-Szenario werden die Bedürfnisse der Familienbetriebe bei Forschung und Entwicklung berücksichtigt. Sie können zwischen verschiedenen kostengünstigen Technologien auswählen. Das Kosten-Nutzen-Verhältnis der Digitalisierung verbessert sich, und die Obstbaubetriebe können den Bedarf an Saisonarbeitskräften verringern und die Attraktivität ihrer Familienbetriebe für Betriebsnachfolger erhöhen, was den Fortbestand traditioneller Obstbetriebe erleichtert. Die Digitalisierung kann den Pestizidbedarf senken, die Erhaltung der biologischen Vielfalt fördern, das Image des Obstbaus verbessern und die regionale Attraktivität für Naherholung und Tourismus steigern.

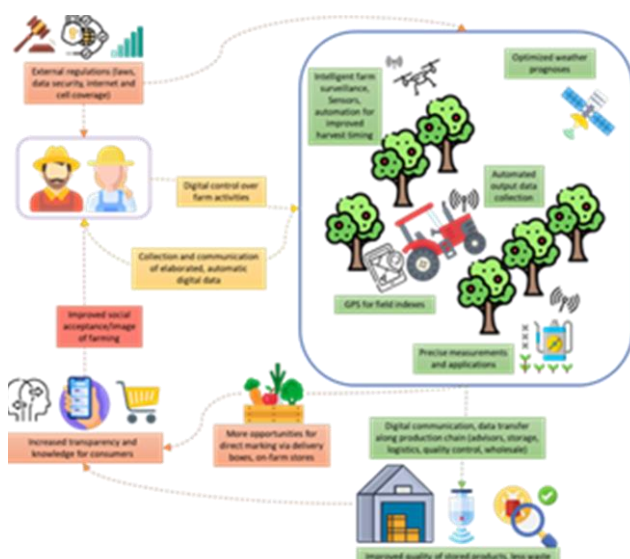
Im WnW-Szenario wird die Digitalisierung wegen Bedenken bei Datenhoheit und -sicherheit abgelehnt, jedoch werden die Betriebe teilweise durch den Markt zur Digitalisierung gezwungen. Eine weitere Sorge betrifft das negative Image einer naturfernen industrialisierten Obstproduktion mit negativen Auswirkungen auf die Landschaft, Naherholung und touristische Attraktivität. Familienbetriebe werden von der Digitalisierung abgehängt, da der Kompetenzerwerb teuer und zeitaufwändig ist. Die biologische Vielfalt nimmt durch den Hightech-Anbau und vermehrte Eingriffe zum Schutz der Produktion vor klimabedingten Wettereinflüssen weiter ab. Die Digitalisierung in Familienbetrieben ist aufgrund der hohen Kosten nicht wirtschaftlich, auch nicht bei staatlicher Förderung, da diese zu gering ist.

DISKUSSION ÜBER DIE POLITIK

Während des LL-Workshops wurden die Interessenvertreter ermutigt, politische Maßnahmen auf der Grundlage der folgenden Fragen zu identifizieren: *"Welche Maßnahmen müssten ergriffen werden, wenn wir von plausiblen zukünftigen Chancen profitieren oder Risiken, die die Zukunft mit sich bringen könnte, abmildern wollen?"* Später überlegten die Teilnehmenden, ob die politischen Maßnahmen und Ideen aus dem BnB-Szenario auch im WnW-Szenario wirksam wären und umgekehrt. Als Ergebnis wurden politische Empfehlungen identifiziert, die potentiell für beide Szenarien wirksam sind, da sie die Chancen im BnB-Szenario fördern und die Risiken im WnW-Szenario abmildern.

Eine zentrale Maßnahme ist die politische Unterstützung einer flexiblen und an die Bedürfnisse von Familienbetrieben angepasste Technologieentwicklung. Diese beinhalten die Förderung kooperativer Betriebsübergreifende Digitalisierungsansätze und unabhängige Beratungseinrichtungen für Familienbetriebe.

In beiden Szenarien ist eine Verbesserung der digitalen Infrastruktur und des Kompetenz- und Dienstleistungsnetzes in ländlichen Regionen erforderlich, um eine kontinuierliche und leistungsstarke Datenübertragung und qualitativ hochwertige digitale Anwendungen zu ermöglichen.



Es besteht Ungewissheit darüber, wie Familienbetriebe von der Digitalisierung profitieren können. Die Digitalisierung könnte – so die Hoffnung – dazu beitragen, die Prozesse einer nachhaltigen Obstproduktion mit hoher Qualität und geringen Arbeitsbelastungen und Umweltauswirkungen zu optimieren und gleichzeitig die gesellschaftlichen Ziele, wie den Erhalt der biologischen Vielfalt und des Erholungswerts der Landschaft zu berücksichtigen.

Eine der größten Herausforderungen in beiden Szenarien besteht darin, die Standardisierung, Verwaltung, Sicherheit und die Hoheit an den erfassten Daten und sensiblen Informationen zu verbessern, um die Skepsis der Obstbaubetriebe gegenüber der Digitalisierung zu überwinden.

In beiden Szenarien sind bäuerliche Familienbetriebe durch die hohe Nachfrage und steigende Mindestlöhne für ausländische Saisonarbeitskräfte bei der Obsternte und den damit verbundenen bürokratischen Aufwand bedroht. Die entwickelten digitalen Technologien entsprechen jedoch nicht immer den Erwartungen und Anforderungen der Familienbetriebe.



PRIORITÄT HAT DIE VERBESSERUNG DER DIGITALEN INFRASTRUKTUR UND DER KOMPETENZEN VON FAMILIEN-BETRIEBEN SOWIE DIE FÖRDERUNG DER KOOPERATIVEN NUTZUNG VON DIGITALISIERUNGS-ANGEBOTEN.

Entscheidungsträger in Politik, Verwaltung und Wirtschaft sollten gut ausgestattete und geeignete Fördermaßnahmen entwickeln und Investitionen in die Digitalisierung von Familienbetrieben erleichtern. Das Image von Obstbau-betrieben könnte sich verbessern, wenn prozessbedingte Umweltauswirkungen in den Obstplantagen durch digitale Technologien verringert werden.



This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

Ganzheitliche und unabhängige Bewertung von digitalen Einzel- und Gesamtlösungen

- Wir empfehlen, eine inter- und transdisziplinäre Technologieentwicklung mit Experten, Interessengruppen und Praktikern, um die Vor-/Nachteile und Anwendbarkeit einzelner techno-logischer Lösungen sowie eines kohärenten Gesamtsystems und dessen Integration in kooperative Strukturen aus techno-ökonomischer, rechtlicher, ökologischer und gesellschaftlicher Sicht zu bewerten. Dies betrifft sensorgestützte Apfelernte-roboter, autonom fahrende Traktoren für den Kistentransport, Minidrohnen zum Monitoring und zur Pflege des Anlagenbestands und zum Erhalt der Biodiversität.

Verbesserung der Anwendbarkeit und Bezahlbarkeit von digitalen Lösungen in Familienbetrieben

- Wir empfehlen, die Entwicklung von Technologien und neuen Konzepten zur Verbesserung der Anwendbarkeit und Bezahlbarkeit digitaler Technologien für Familienbetriebe zu unterstützen, um zu verhindern, dass ein technologischer Schub diese „abhängt“ und den Strukturwandel beschleunigt.

Entwicklung eines rechtlichen Rahmens zur Regelung der Datensicherheit und Datenhoheit

- Wir empfehlen, die Entwicklung und Verbesserung rechtlicher und regulatorischer Instrumente zur Förderung eines ethisch verantwortungsvollen und standardisierten Umgangs mit den Werten und Anforderungen von Familienbetrieben in den Bereichen Datenschutz, Cybersicherheit und künstliche Intelligenz. Dabei ist aktiv auf deren Bedenken einzugehen, die Kontrolle über die Datenhoheit, das Daten- und Prozess-management und die Kompetenzen zur unabhängigen Bewirtschaftung zu verlieren.

Ausbau der digitalen Infrastruktur in ländlichen Gebieten

- Wir empfehlen einen raschen Ausbau des Breitbandzugangs in ländlichen Regionen als Voraussetzung für die digitale Erfassung und Analyse von Daten und die Prozesssteuerung. Ohne eine schnelle und zuverlässige Internetverbindung können Familienbetriebe in ihren teilweise abgelegenen Obstplantagen die Chancen der Digitalisierung nicht nutzen.

Förderung der digitalen Kompetenzen

- Wir empfehlen, die digitalen Fähigkeiten von Familienbetrieben durch staatliche Förderung der Aus- und Weiterbildung zu verbessern und die Nutzung von professionellen und unabhängigen Digitalisierungsberatern zu unterstützen.

Dieses Kurzdossier wird im Rahmen des EU-geförderten DESIRA-Projekts veröffentlicht und zielt darauf ab, Empfehlungen für politische Entscheidungsträger zu geben, wie die Digitalisierung im Kontext der Obstproduktion in Deutschland unterstützt werden kann.

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Rückverfolgbarkeit von Rundholz

Die Europäische Holzverordnung (EUTR) ist ein Beispiel für die Konsolidierung der europäischen Bemühungen zur Unterbindung illegaler Abholzungspraktiken. Sie soll sicherstellen, dass Holz und holzverwandte Produkte auf dem europäischen Markt legal sind. Bei der Überprüfung der aktuellen EUTR sind gemeinsame nationale EUTR-Standards zwischen den Ländern der Europäischen Union von grundlegender Bedeutung, die es jedoch derzeit nicht gibt. Gemeinsame Normen sind die Mindestvoraussetzung für eine stärker technologiebasierte, einheitliche Umsetzung der EUTR. Darüber hinaus besteht Bedarf an einer wegweisenden Technologie bzw. einer Kombination von Technologien. Bislang hat sich keine effiziente, kostengünstige, einfach zu verwendende und weltweit verfügbare Technologie durchgesetzt, die eine einfache Rückverfolgbarkeit von Holz ermöglichen würde. Mit Blick auf die Zukunft lassen sich zwei mögliche Szenarien für die Rückverfolgbarkeit von Rundholz in Europa definieren: ein "nachhaltiger Weg" oder ein "Verwertungsweg". Die Wahrheit liegt höchstwahrscheinlich irgendwo in der Mitte zwischen diesen beiden Pfaden. Die gemeinsam mit den Living Lab-Mitgliedern behandelte Frage lautete: Wird die Rückverfolgbarkeit von Holz ins Rampenlicht rücken als ein Versuch, illegale Abholzungspraktiken zu vertuschen, oder als eine Bestätigung legaler, nachhaltiger Praktiken?

KONTEXT

Österreich hat ein strenges, seit langem bestehendes Forstgesetz, das Nachhaltigkeit garantiert: Das Wort Nachhaltigkeit stammt aus dem Bereich der Forstwirtschaft und bedeutet, dass mehr Zuwachs als Abholzung garantiert wird. Um den jährlichen Bedarf an Rundholz zu decken, muss jedoch Holz auf dem europäischen und internationalen Markt eingekauft werden. Dies birgt die Gefahr, dass illegale Produkte auf den europäischen Markt gelangen, wogegen die Holzverordnung der Europäischen Union (EUTR) vorgeht; Illegalität bedeutet nicht nur das Abholzen gefährdeter Baumarten, sondern auch die Verletzung nationaler Forstgesetze. Während in der Forstwirtschaft etliche digitale Technologien Anwendung finden, ist der Grad der Digitalisierung bei der Umsetzung der EUTR eher gering. Dies führte zu folgender Schwerpunktfrage: "Wie kann die Digitalisierung die Umsetzung der Europäischen Holzhandelsverordnung (EUTR) für importiertes Rundholz in Österreich unterstützen und durchsetzen?"

Digitalisierung betrifft die Verfügbarkeit von Informationen sowie die Art und Weise des Informationsaustauschs. Digitalisierung ermöglicht eine schnellere Verbreitung von Informationen; allgemein gesprochen wirkt Transparenz illegalen Aktivitäten entgegen. Umgekehrt bedarf eine Fülle von Informationen einer effizienten Datenfilterung, -speicherung und -verteilung. Die Forstwirtschaft ist ein Bereich, in dem ein hohes Maß an technologischem Fortschritt zu verzeichnen ist. Die institutionellen Voraussetzungen sind jedoch nicht vorhanden, damit technologische Innovationen bei der Bekämpfung des illegalen Holzeinschlags an Bedeutung gewinnen.



FORSCHUNGSANSATZ

Die Aktivitäten in diesem LivingLab (LL) drehen sich um vergangene, aktuelle und künftige Bemühungen zur Begrenzung des illegalen Holzhandels. Um mögliche zukünftige Szenarien für die Rückverfolgbarkeit von Holz in Europa zu erarbeiten, wurden Szenario-Workshops abgehalten. Die Fragestellung der Workshops lautete: "Wie wird die Rückverfolgbarkeit von Holz im Jahr 2031 in Europa aussehen?" Diese Formulierung ermöglicht es, einen breiten Kontext zu schaffen, in dem Prozesse und alle relevanten Besonderheiten erforscht und die Vorstellungen der Interessensgruppen von einem zukünftigen Zustand artikuliert werden können.



Digitale Technologien bieten eine globale Lösung für das Problem des illegalen Holzhandels

Zur Beschreibung der Akteure greifen wir auf das Konzept des sozio-cyber-physikalischen Systems (SCP) zurück. Der sozioökonomische Bereich des SCP besteht aus den mit Holz handelnden Akteuren, den beteiligten Ländern und den Aufsichtsbehörden. Die Cyber-Domäne umfasst die digitalen Technologien, die zur Kontrolle der Legalität eingesetzt werden. Der physische Bereich umfasst alle Elemente der Wälder und des Holzes. Gegenwärtig kann der SCP als ein Wettstreit zwischen wirtschaftlichen Interessen und natürlichen Interessen (physischer Bereich) betrachtet werden.

ENTWICKELTE SZENARIEN

Die beiden entwickelten Hauptszenarien, werden als "Verwertungs-" und "Nachhaltigkeitsszenario" bezeichnet. Das Konzept des ersten Szenarios folgt der Idee, den Rohstoff Wald auf nicht nachhaltige Weise zu nutzen. Gewinn wird auf Kosten anderer erzielt. In diesem Szenario ist die Natur auf dem Rückzug. Im Gegensatz dazu beruht die Idee des Nachhaltigkeitspfads auf dem Prinzip, weniger zu verbrauchen als zu nachwächst. Der Kern ist ein nachhaltiger Umgang mit

der Natur, der sich positiv auf das Problem der Holzurückverfolgung auswirkt.



Im Szenario "Ausbeutung" sind die Gewinner die Wirtschaftsakteure, die nach einer Profitsteigerung streben. Die Umwelt gerät zunehmend unter Druck, was zu einem Verlust an biologischer Vielfalt führt. Die technologischen und politischen Triebkräfte des Wandels fehlen in diesem Szenario, um zu helfen. Eine Möglichkeit sind Maßnahmen wie die Ausweisung von Naturschutzgebieten. Die steigende Nachfrage treibt die Illegalität voran. Eine Möglichkeit, den Anstieg der Illegalität zu stoppen, bietet die Komponente der digitalen Technologien. Der externe technologische Fortschritt könnte sich positiv auswirken und die Aussicht auf das negative Ausmaß verringern.

Im zweiten Szenario gewinnt die Nachhaltigkeit immer mehr an Bedeutung. Dies wirkt sich positiv auf die Natur aus. Angetrieben durch den Abbau bürokratischer Hürden gewinnen Technologien an Aufschwung, bestehende und neue Technologien werden weiterentwickelt. Davon profitieren Wälder, sie haben mehr Raum zum Gedeihen und Atmen. Unternehmen müssen sich bis zu einem gewissen Grad neu orientieren. Sie müssen lernen, auf den Zug der Nachhaltigkeit aufzuspringen und ihn für sich arbeiten zu lassen. Das bedeutet sowohl Chancen als auch Herausforderungen; potenzielle finanzielle Herausforderungen für Verbraucher und Industrie können ebenfalls als Chancen gesehen werden.

POLICY DISKUSSION

Die EU-Holzverordnung (EUTR) verbietet, dass Holz aus illegalen Quellen auf den EU-Markt gelangt. Die EUTR überträgt der Person oder Organisation, die das Holz auf den Markt bringt, die Verantwortung für die Durchführung der Sorgfaltspflicht, um sicherzustellen, dass das Holz mit den Gesetzen des Landes, in dem es geerntet wird, übereinstimmt. Das größte Hindernis für die Einführung einer verstärkt technologiebasierten EUTR ist der Mangel an nationalen Normen und Anreizen. Ohne einen gemeinsamen Nenner wird es nicht möglich sein, gemeinsame Praktiken zwischen den Teilnehmerländern der EUTR zu etablieren. Theoretisch sind die Voraussetzungen bereits vorhanden: Die Forstwirtschaft ist ein Bereich, der ein hohes Maß an technologischem Fortschritt erlebt; Beobachtungsdaten sind im Überfluss vorhanden, Technologien zur Verfolgung einzelner Objekte stehen kurz vor der Reife, vernetzte Technologien wie Blockchain oder Internet of Things (IoT) gewinnen an Bedeutung; Konnektivität ermöglicht die schnelle und weite Verbreitung von Informationen; lediglich die institutionellen Voraussetzungen sind noch nicht gegeben, damit technologische Innovationen an Bedeutung gewinnen.



ES MÜSSEN WELTWEIT ANWENDBARE LÖSUNGEN GEFUNDEN WERDEN, UM EINE TRANSPARENTE UND EFFIZIENTE RÜCKVERFOLGBARKEIT VON HOLZ ZU GEWÄHRLEISTEN

Eine Möglichkeit, diese Situation zu umgehen, könnte darin bestehen, Anreize statt Strafen zu schaffen. Aus Holzprodukten, die mit Hilfe digitaler Technologien nachverfolgt werden, könnten neue Zertifikate oder Qualitätssiegel entstehen, welche die Einhaltung der Rechtsvorschriften garantieren; Unternehmen, die bestimmte Technologien einsetzen, könnten Steuererleichterungen erhalten. Solche Bedingungen könnten das Potenzial haben, technische Innovationen durch die Demonstration bewährter Verfahren voranzutreiben.

Handlungsbedarf besteht nicht nur auf nationaler Ebene, sondern auch auf EU-Ebene. Die Mitgliedstaaten sollten ihre Verpflichtung bekräftigen, die Umsetzung der EUTR wirksam zu überwachen und im Falle von Verstößen geeignete Maßnahmen zu ergreifen, z. B. verwaltungs- oder strafrechtliche Maßnahmen und Sanktionen. Die EUTR darf nicht nur eine Erklärung der guten Absichten sein, sondern muss ein wirksames Instrument sein.

Die Umsetzung ist entscheidend für die Wirksamkeit der Verhinderung des illegalen Holzhandels, insbesondere durch die EUTR. Die Zusammenarbeit ist ein entscheidendes Instrument zur Unterstützung der Vollstreckung. Die Zusammenarbeit kann verschiedene Formen annehmen, wobei ein wichtiger Bereich die Kooperation zwischen den Zollverwaltungen der Einfuhr- und Ausfuhrländer sowie anderen relevanten Regierungsbehörden ist. Informationen, die z. B. mit Hilfe digitaler Technologien gesammelt und vor Ort von externen Parteien, wie z. B. unabhängigen Beobachtern der Zivilgesellschaft, bestätigt werden, sind ebenfalls entscheidend.





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POLITISCHE MÖGLICHKEITEN

Anpassung der politischen Regelungen zur EUTR

Eine Änderung der EUTR und eine anschließende Umsetzung der Reform könnten dazu dienen, national einheitliche Standards zu schaffen und eine Umstellung der derzeitigen Sorgfaltspflichtverfahren zu erzwingen.

Anreize für den Einsatz eines fälschungssicheren Sorgfaltspflichten-Systems (DDS)

- Das derzeitige DDS basiert in hohem Maße auf Papierdokumenten, die fälschungsanfällig sind. Alternativen zur Überprüfung der Holzherkunft, z. B. Markierungen und der Einsatz von Blockchain-Technologien, würden mehr Effektivität und Effizienz bei der Gewährleistung der Legalität garantieren. Anreize könnten z. B. strengere politische Vorschriften sowie Steuererleichterungen für die freiwillige Anwendung digitaler Technologien zur Rückverfolgbarkeit sein.

Technologische Ausbildung

- Der Einsatz von Kontrolleuren in den zuständigen Behörden, die Fachleute sind und/oder ein umfassendes Verständnis der Lieferketten haben, sowie multidisziplinäre Schulungen mit externen Experten gelten als bewährte Methoden und sollten durchgesetzt werden.
- Die Kapazitäten auf nationaler Ebene müssen aufgestockt werden, um eine hervorragende Abdeckung der Marktteilnehmer zu gewährleisten und regelmäßige und häufige Kontrollen zu ermöglichen.
- Die Aufklärungsarbeit sollte verstärkt werden, um sicherzustellen, dass die Betreiber besser über die EUTR und ihre Verantwortung informiert sind.

Förderung der Zusammenarbeit innerhalb und zwischen Ländern

- Es mangelt an einer formalisierten Zusammenarbeit und rechtzeitigen Kommunikation zwischen den Ländern und zwischen den Beamten der Durchsetzungskette innerhalb der Länder. Ein Austausch zwischen den Ländern oder gemeinsame Inspektionen könnten bewährte Verfahren darstellen.
- Die grenzüberschreitende Zusammenarbeit und der regelmäßige Austausch zwischen den verschiedenen beteiligten Behörden sollte ermöglicht und verbessert werden.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalization in the context of roundwood traceability in Austria.

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Digitalizáció: Gazdasági és társadalmi hatások a vidéki térségekben (Magyarország)

A digitalizációra sürgősen szükség van Magyarországon. Az ország területének jelentős része vidéki jellegű. Ezeken a területeken a mezőgazdaságnak kulcsszerepe van a jövedelemtermelésben és a szociális helyzet javításában. A digitalizáción belüli új trendek azonban a mezőgazdaságot sem kerülik el. A digitalizáció egyre nagyobb szerepet játszik a mezőgazdaság környezetre gyakorolt hatásának csökkentésében, és alapvetően meghatározza az EU jövőbeli menetrendjét. Ennek ellenére Magyarországon a digitalizációban komoly hiányosságok tapasztalhatók a mezőgazdasági infrastruktúra és a humán tőke területén.

Ez a szakpolitikai összefoglaló Magyarországra, különösen az észak-alföldi régióra összpontosít. Két forgatókönyvet vettünk figyelembe, egy pozitív és egy negatív forgatókönyvet. A pozitív forgatókönyv (1) szerint a mezőgazdasági munkaerő képes elsajátítani a megfelelő digitális készségeket és lépést tartani a digitalizációs fejlődéssel. A negatív forgatókönyvben (2) a precíziós technológia továbbra is költséges marad, így a kistermelők nem lesznek képesek kihasználni annak előnyeit. A szakpolitikai lehetőségek minden esetben egy olyan digitális gazdaság kiépítésére összpontosítanak, ahol a munkaerő rendelkezik a digitalizációs (különösen a precíziós) technológiákhoz szükséges készségekkel.

HÁTTÉR

A legfrissebb, 2020-as előzetes mezőgazdasági összeírás eredményei szerint a digitalizáció nem jellemző a magyar gazdákra. A gazdálkodók elsősorban banki ügyintézésre és elektronikus dokumentumkezelésre használnak számítógépet, de arányuk továbbra is 30% alatt marad. A digitális eszközök használata minden korcsoportban az elektronikus dokumentumok és az általános irodai szoftverek használata mellett elsősorban a banki ügyintézésre irányult, de az életkor előrehaladtával ezek aránya is csökkent. A precíziós eszközök használata kritikusan alacsony volt Magyarországon. A leggyakrabban használt eszköz a természetállapot-felmérés volt, de ennek aránya is csak 5,3% volt a gazdaságok körében.

Az irányított/automatikus kormányzás, a differenciált munkavégzés és az általános környezeti érzékelők használata szintén széles körben elterjedt, de arányuk nem érte el a 4%-ot. Meglepő módon a 163,7 ezer gazdálkodóból több mint 123 ezer gazdálkodó nem használta ezeket az eszközöket, mert úgy gondolja, hogy nincs rá szüksége, míg 22 ezer gazdálkodó nem rendelkezett a szükséges ismeretekkel. Mindössze 18,4 ezer gazdálkodó mondta azt, hogy a technológia drága, hogy a gazdaság eszközei nem alkalmasak a használatukra,

vagy hogy a precíziós mezőgazdasági eszközöket a korlátozottan rendelkezésre álló képzés és tanácsadás miatt nem használják. A fiatal gazdák a technológia magas árát jelölték meg a második legfontosabb okként, míg az idősebb gazdák inkább a korszerű ismeretek hiányát említették. Ezek a tendenciák az általános digitalizációs készségeket tükrözik. A várakozások szerint a jövőben 10 munkahelyből 9 digitális képzettséget fog igényelni, miközben az EU lakosságának 44%-a nem rendelkezik semmilyen digitális készséggel (EIP-AGRI, 2020). A digitalizáció egyik kiemelt témája Magyarországon a precíziós mezőgazdaság (PA) lehetséges szerepe a hatékonyság és a jövedelmezőség szempontjából. A precíziós mezőgazdaság (PM) olyan gazdálkodási koncepció, amely a termények (vagy az állattenyésztés bizonyos aspektusainak) szántóföldek közötti és szántóföldön belüli változékonyságának megfigyelésén, mérésén és az arra való reagáláson alapul. Az elsődleges előnyök elsősorban a terméshozam és/vagy a termelés jövedelmezőségének növeléséből származnak a gazdálkodók számára. További előnyök származnak a jobb munkakörülményekből, az állatjóllét javulásából és a környezetvédelem különböző aspektusainak javítási lehetőségeiből. Elterjedését azonban nagymértékben hátráltatják a gazdaságok

szerkezetében mutatkozó különbségek és a gazdaságok heterogenitása (EUROPEAN PARLIAMENT, 2014).

Minden gazdálkodási mód esetében hasonló volt a korösszetétel. A gazdaságok vezetői közül 60-65%-a legalább 40 éves, 20-25%-a pedig 65 évesnél idősebb volt.

A világ minden tájáról származó példák alátámasztják azt a nézetet, hogy a modern technológiák alkalmazásának helye van a mezőgazdaságban, függetlenül a gazdaságok méretétől és tevékenységi körétől. A precíziós mezőgazdaság, majd később az automatizálás és robotizálás vívmányainak bevezetése növelheti a mezőgazdasági termelés jövedelmezőségét, ezáltal növelve a mezőgazdaság vonzerejét a munkaerő-utánpótlás számára, amire nagy szükség van, hiszen a mezőgazdaság Magyarországon is, mint a világ számos más régiójában, komoly munkaerőhiánnyal küzd. Ráadásul a mezőgazdasági termelés átalakulása új kihívások elé állítja a munkavállalókat: a mezőgazdaságban jelenleg foglalkoztatott munkavállalók, valamint az önfoglalkoztató gazdálkodók arányaiban nem rendelkeznek megfelelő készségekkel és ismeretekkel ahhoz, hogy képesek legyenek kezelni a modern technológiákat. Továbbá a mezőgazdasági dolgozók körében különösen gyakori az elöregedés jelensége, ami sötét képet fest az agrárinformatikai fejlesztések felhasználása szempontjából.

A gazdaságszerkezet e sajátosságai a magyar mezőgazdaság elöregedéséről árulkodnak, amely nagymértékben a növénytermesztésre támaszkodik.



KUTATÁSI MEGKÖZELÍTÉS

A fenti adatok azt sugallják, hogy az ismeretek hiánya nagyban hozzájárul a digitalizáció hiányához (a precíziós gazdálkodás esetében). A fiatal gazdálkodók esetében a technológia ára is akadályozza annak használatát. További gondot jelenthet

a precíziós eszközök használata során nyert adatok biztonságos tárolása, ami a sikeres használat előfeltétele. A problémák kiküszöbölése elősegítheti a precíziós gazdálkodás elterjedését, és ezáltal hozzájárulhat a nyereség növeléséhez, valamint a környezetterhelés csökkentéséhez.

Összefoglalva megállapíthatjuk, hogy a precíziós gazdálkodás gazdaságossága továbbra is fejlődést jelent, mivel a technológiák és a gazdálkodási technikák a digitalizációval együtt folyamatosan fejlődnek. A digitalizáció hatással van a társadalmi és intézményi kapcsolatokra, amelyek egyre nagyobb mértékben igénylik és függenek a digitális technológiáktól. A vidéki területeken a digitális technológiáknak pozitív és negatív társadalmi, gazdasági és környezeti hatásai egyaránt lehetnek. Magyarországon azonban a precíziós gazdálkodás elterjedését továbbra is befolyásoló legfontosabb tényező nem más, mint a szakképzett munkaerő hiánya. Globális viszonylatban természetesen a nyersanyagárak is nagy hatással vannak a jövedelmezőségre. A megemelkedett nyersanyagárak, amelyek nagyobb kiadásokat jelentenek a gazdálkodóknak, az új technológiákba (köztük a precíziós gazdálkodásba) történő nagyobb beruházások késedelméhez vagy akár meg sem valósulásához vezethetnek. A digitalizáció térnyerését két akadály gátolja a térségben, ezért e két probléma köré két kutatási kérdés is megfogalmazódott.

Fókuszban lévő kérdések:

- Milyen tényezők befolyásolják a precíziós technológiák elterjedését?
- Milyen szerepet játszik a digitalizáció terjedése abban, hogy a vidéki térségek képesek-e megtartani a munkavállalókat?

Ezeket a kérdéseket indokolja az a tény, hogy informálisan az egyik leggyakrabban idézett érv a precíziós technológiák elterjedése ellen az, hogy azok drágák. Ezzel szemben a legfrissebb országos felmérésből kiderült, hogy elterjedésük elmaradásának fő oka az, hogy a gazdálkodók úgy gondolják, hogy nincs rájuk szükségük a termelés során (123 300 válaszból 75,3% választotta ezt a lehetőséget). A másik fő ok az volt, hogy nem

rendelkeznek a szükséges készségekkel és ismeretekkel (13,4%). Más szóval a válaszok többsége a tudás hiányára vezethető vissza. A technológia ára valójában csak a harmadik tényező volt az összes válasz 5,4%-ával (KSH, 2021).

Az első kérdés a szakirodalmi áttekintés, a félig strukturált mélyinterjúk illetve a Living Lab (vállalkozások vezetőiből, egyetemi oktatóból, kutatókból, stb. álló, a kutatás érdekében együttműködő testület) résztvevőinek véleményén alapul.

A második kérdés informális megbeszéléseken és a szakirodalom eredményein alapul. A magyar mezőgazdaságban dolgozó szereplők munkájuk megfelelő elvégzéséhez szükséges képzettségi szintje alacsony. Informális beszélgetéseink során ezek az emberek azt is hangsúlyozták, hogy addig nem tudnak technológiafejlesztésben gondolkodni, amíg a legalapvetőbb műveletekhez is munkaerőhiánnyal kell szembenézniük (adott esetben még az Európai Unió béreknél sem magasabb bérekért). Itt is a tudáshiány esetével állunk szemben, ami szintén az első kérdéshez kapcsolódik. A mezőgazdaság esetében a legtöbb kutatás a lemorzsolódási arányokra összpontosít, de valójában a technológiai fejlődés a szakképzett munkaerő hiányához vezethet, mivel a fejlettebb technológia megfelelő képzettséget, valamint speciális ismereteket és készségeket igényel

KIDOLGOZOTT FORGATÓKÖNYVEK

A pozitív forgatókönyv (1) szerint a mezőgazdasági munkaerő képes elsajátítani a megfelelő digitális készségeket és lépést tartani a digitalizáció fejlődésével. A negatív forgatókönyv (2) szerint a precíziós technológia továbbra is költséges marad, így a kistermelők nem lesznek képesek kihasználni annak előnyeit.

Az első forgatókönyvben feltételezzük, hogy a jelenlegi digitalizálási képességek hiánya csökken. Ennek eredményeképpen a régió mezőgazdasági termelői képesek lesznek a digitalizáció előnyeit kihasználni. Melyek a legfontosabb kapcsolódó kihívások? A digitalizációs képességek hiánya rendkívül heterogén a vállalkozások között, ami megnehezíti a célzott szakpolitikák kidolgozását.

A közszolgáltatások alacsony digitalizáltsága

még inkább megnehezíti az általános digitális környezethez való alkalmazkodást. A régióban jelenleg nincs olyan informatikai szakképzés, amely az agrárgazdaságra összpontosítana. Az egyik fő probléma, hogy a termelők idősödő korösszetétele akadályozza a digitalizáció terjedését. Az idősebb gazdálkodók kevésbé nyitottak a digitális megoldásokra. Mivel a legtöbb gazdálkodó jelenleg nem támaszkodik az általa gyűjtött adatokra (vagy gyakran nem gyűjt adatokat kellő részletességgel), nehéz felismerni az adatgazdaság előnyeit. A digitalizáció elterjedését az üzemméret sem támogatja. Ráadásul a mezőgazdasági képzőintézmények nem nyújtanak naprakész gyakorlati ismereteket, így a gazdáknak gyakran számolniuk kell egy betanulási időszakkal. Hatékony megoldás lehet a felsőoktatás, a szakképzés és az értékláncban résztvevő mezőgazdasági vállalkozások tevékenységének integrálása a tudásbázis növelésének érdekében. A mezőgazdasági vállalkozás gyakorlati tapasztalatot nyújt, a felsőoktatás és a szakképzés pedig folyamatos innovációval és kutatási tapasztalatokkal segíti a gazdaságokat.

A második forgatókönyvben feltételezzük, hogy a precíziós technológia továbbra is költséges marad, így a kistermelők nem lesznek képesek kihasználni annak előnyeit. A generációváltás kérdése részben hozzájárulhat a digitalizáció elterjedéséhez, de sok gazdaság esetében ez a kérdés nem egyértelmű.

A precíziós műszerek elterjedtsége jelenleg alacsony. Fennáll a veszélye annak, hogy sok termelő nem ismeri fel, hogy szükség van ezekre az eszközökre, míg egyes termelők nem rendelkeznek a technológia működtetéséhez szükséges szakértelemmel. Különös kockázatot jelent, hogy a gazdaság kis mérete miatt a precíziós eszközöket nem lehet teljes mértékben kihasználni. Az egyik fő probléma jelenleg a tőkehiány, ami lehetetlenné teszi a kistermelők számára a technológia megvásárlását. Továbbá a termelőknek hosszú távú és stabil jogi és gazdasági környezetet kell biztosítani, mivel ez az alapja a precíziós technológiák adaptálásának. Motiváló lehet a támogatási rendszer bővítése és átalakítása, valamint a nyílt, ingyenes adatok hozzáférhetővé tétele.



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SZAKPOLITIKAI KÖVETKEZMÉNYEK

A magyarországi agrár- és agrártudományi képzésekkel kapcsolatban megfogalmazott kritikák többsége a megfelelő képzési koncepció hiányára és a gyakorlati ismeretek alacsony elterjedtségére utal. A felhasználók, a tanulók és a hallgatók szempontjából mindez azt jelenti, hogy a képzések - főleg a magasabb képzettségi szinteken, különösen a felsőoktatás területén - elsősorban elméletközpontúak lesznek, és viszonylag kis arányban tartalmaznak gyakorlati képzési elemeket. Részben ennek a képzési struktúrának köszönhető, hogy a mezőgazdaság versenyképessége és a munkaerő foglalkoztathatósága kedvezőtlennek, a mezőgazdaságban dolgozó munkaerő szakmai képzettségi szintje pedig alacsonynak tekinthető. Mindez azt jelenti, hogy a precíziós technológiák elterjedése nagymértékben javítható lenne, ha a gazdálkodók felismernék a precíziós technológiák nyújtotta lehetőségeket, és képesek lennének ezt a tudást a gyakorlatba átültetni. Másrészt szoros összefüggésnek kell lennie a gazdálkodók alacsony képzettségi szintje és a szükséges ismeretek és készségek hiánya, valamint az között, hogy nem ismerik fel a technológiában rejlő lehetőségeket.

Életképes adatgazdaság létrehozása

- A politikanak ösztönöznie kell a mezőgazdasági szereplők adatgyűjtését és azok feldolgozását.
- Csökkenteni kell az adatokhoz való hozzáférés költségeit.
- Támogatni kell a gazdaságokat a gazdaságszintű adatok gyűjtésében, a gazdaságirányítási alkalmazások használatában és az ezeken alapuló termelési döntések meghozatalában.

A szükséges készségek elsajátítása - a mezőgazdasági munkaerő fejlesztése

- A digitális készségeket fejleszteni és naprakészen tartani kell.
- Meg kell erősíteni az elméleti képzés és a gyakorlat közötti kapcsolatot.
- A felsőoktatásnak és az értéklánc szereplőinek szorosabban együtt kell működniük a közös tudásbázis kialakítása érdekében.
- Biztosítani kell a digitalizációval foglalkozó tanácsadó testületek működését, és elérhetővé kell tenni az érdekeltek számára.

Kockázatkezelés és együttműködés

- Olyan digitális ökoszisztémára van szükség, amelyben a mezőgazdasági szereplők alkalmazkodni tudnak a digitalizáció előnyeinek kihasználásához.
- A mezőgazdasági szereplőkkel meg kell ismertetni a precíziós gazdálkodás előnyeit.
- Biztosítani kell, hogy a kistermelők hozzáférjenek a precíziós eszközökhöz, és a támogatási és szabályozási rendszert ennek megfelelően kell kialakítani.

Összességében elmondható, hogy a mezőgazdasági munkaerő folyamatos képzéssel történő fejlesztésével megállítható a vidéki népesség csökkenése. Ehhez elengedhetetlenek a nemzeti és helyi hatóságok által kínált, legalább részben uniós forrásokból támogatott, naprakész információs rendszerek, oktatási programok és képzések.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy-makers on how to support digitalization in the context of Digitisation: Economic and Social Impacts in Rural Areas in the North Great Plain region, Hungary.

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Unkrautregulierung im Schweizer Biogemüsebau

Das Schweizer DESIRA Living Lab (LL) untersucht, wie die Digitalisierung und der Einsatz von Robotern und anderen digitalen Werkzeugen den biologischen Gemüseanbau in der Schweiz unterstützen können. Der Fokus liegt dabei auf der Unkrautbekämpfung. Diese ist im biologischen Gemüseanbau mit verschiedenen Herausforderungen konfrontiert, wie z.B. der sinkenden Verfügbarkeit von Arbeitskräften. Die Digitalisierung ist eine vielversprechende Strategie um diese Herausforderungen zu überwinden. Doch ist es derzeit noch ungewiss, wie die Unkrautbekämpfung in Zukunft durch die Digitalisierung konkret gestaltet werden könnte.

Um dies zu untersuchen, wurde die folgende Frage ausgearbeitet und in Stakeholder-Workshops diskutiert: **Wie sieht Unkrautregulierung im Schweizer Biogemüsebau im zunehmend digitalisierten Zeitalter des Jahres 2031 aus?**

Ausgehend von zwei, mit Stakeholdern entwickelten Hauptszenarien, einem positiven und einem negativen, wurden fünf zentrale Politikoptionen erarbeitet: (1) Die Vorteile der Digitalisierung kommunizieren; (2) ein innovationsfreundliches Umfeld schaffen; (3) digitale Expert*innen in Lehre, Beratung und Agrarjournalismus integrieren; (4) die wirtschaftlichen Rahmenbedingungen für die Digitalisierung verbessern; und (5) die Diversifizierung von Fruchtfolgen und landwirtschaftlichen Aktivitäten weiter fördern.

KONTEXT

Das Schweizer DESIRA Living Lab (LL) untersucht, wie die Digitalisierung und der Einsatz von Robotern und anderen digitalen Werkzeugen den biologischen Gemüseanbau in der Schweiz unterstützen können. Der Fokus liegt dabei auf der Unkrautbekämpfung, die im Biolandbau ein zentrales Thema ist und das Ertragspotenzial der Kulturen bestimmt.

Im Jahr 2019 betrug die Freiland-Gemüseanbaufläche in der Schweiz rund 12'000 ha. Davon sind 23% im biologischen Anbau. Dieser Anteil ist beim Gemüse deutlich höher als über alle landwirtschaftlichen Produkte betrachtet.

Der Markt für Gemüse ist durch Importzölle und Kontingente gut geschützt. Der Markt für Bio-Gemüse wächst, bezogen auf den Prokopfverbrauch, kontinuierlich und erreicht 2019 einen Anteil von 23 % am Umsatz des Bio-Gemüseverkaufs im Jahr 2019. Dies widerspiegelt die Forderung von Politik und Konsument*innen nach einer nachhaltigeren Gemüseproduktion.

Eine grosse Herausforderungen im Gemüseanbau ist genügend Arbeitskräfte zu finden, da die Feldarbeit anstrengend ist. Dafür müssen Roboter an die örtlichen Gegeben

heiten angepasst werden, wie z. B. die Bewältigung von Hängen, Steinen und schweren Böden. Außerdem sollten sie benutzerfreundlich und wirtschaftlich effizient sein. Schliesslich wurde festgestellt, dass die Sicherheit der Roboter und der Datenschutz geklärt bzw. gewährleistet werden müssen. Derzeit ist im Schweizer Gemüsebau noch kein vollautomatisches System im Einsatz. Jätroboter sind derzeit in der Testphase. In der Praxis werden aber nur kamera- und GPS-gesteuerte Häckselmodule eingesetzt, die von Traktoren gezogen werden. Alle autonomen Robotermodelle die für den ökologischen Landbau in Frage kommen, sind mit GPS und Kameras ausgestattet. So kann sich der Roboter ohne menschliches Zutun autonom und präzise bewegen. Die Leistung des Roboters hängt jedoch stark von natürlichen Parametern wie dem Vorhandensein von Steinen ab.



Figure 1. Dino weeding robot (autonomous).
Source: www.naio-technologies.com.

FORSCHUNGSANSATZ

Es bleibt ungewiss, wie die Unkrautbekämpfung in Zukunft durch die Digitalisierung gestaltet werden könnte. Um dies zu untersuchen, wurde eine Szenario-Frage mit Stakeholdern (z. B. Landwirten, Forschern) ausgearbeitet und in Workshops im Hinblick auf praktische Auswirkungen diskutiert.



DER BLICK IN DIE ZUKUNFT ER-LAUBT STAKEHOLDERN, ÜBER MÖGLICHE VERÄNDERUNGEN NACHZUDENKEN. DIES ERLEICHTERT DIE AUSARBEITUNG ENTSPRECHENDER STRATEGIEN UND POLITIKEN.

Die Frage lautet: **Wie sieht Unkrautregulierung im Schweizer Biogemüsebau im zunehmend digitalisiertem Umfeld im Jahr 2031?**

Um diese Frage zu klären, wurden Ende 2021 zwei Workshops durchgeführt. Im ersten Workshop wurden mögliche Szenarien ausgewählt. Im zweiten wurden die Szenarien weiterentwickelt und mögliche politische Optionen erörtert, die die Szenarien entweder unterstützen oder abschwächen könnten. Hier beschränken wir uns auf jeweils ein plausibles positives und negatives Szenario.

ENTWICKELTE SZENARIEN

Das positive Szenario wurde "*Small is beautiful!*" genannt, weil es vor allem die kleineren Betriebe unterstützt. Das Negativszenario heißt "Zurück zur Milchwirtschaft", da die Wirtschaftlichkeit des Gemüsesektors sinkt. Im positiven Szenario wird die Einstellung der Gesellschaft zu Robotern deutlich positiver ausfallen. Dies wird dadurch erreicht, dass den Menschen bewusst gemacht wird, dass beim Einsatz von Robotern zur Unkrautbekämpfung weniger Pestizide benötigt werden.

Außerdem werden Menschen Robotern gegenüber aufgeschlossener sein, wenn klar wird, dass die Digitalisierung in der Landwirtschaft auch in anderen Lebensbereichen Vorteile bringt, z. B. beim autonomen Fahren. Dies wird die Entscheidung der Landwirte für den Einsatz von Robotern ebenso beeinflussen wie die Investitionen in die Entwicklung und das Testen von Robotern. Die entwickelten Roboter werden klein und

leistungsfähiger sein als heute. Aufgrund ihrer geringen Größe werden die Roboter leicht zu bedienen und zuverlässiger.

Zudem stehen mehr qualifizierte Arbeitskräfte zur Verfügung, was dem Technologiesektor zugutekommt und auch den Landwirten hilft, die Unkrautbekämpfung zu digitalisieren. Gleichzeitig besteht politischer Druck, den Einsatz synthetischer Pestizide im konventionellen Sektor weiter zu reduzieren, was sich indirekt auf den Biosektor auswirken könnte. In der Tat könnte dies konventionelle Landwirte dazu bringen, (mehr) digitale Hilfsmittel zu verwenden. Außerdem werden die rechtlichen Bedingungen für den Einsatz digitaler Hilfsmittel klarer sein. Diese Prognose wird durch die Tatsache gestützt, dass die schweizerische Gesetzgebung von der in der EU geltenden Rechtslage inspiriert ist, die wahrscheinlich strenger werden wird. Dazu werden Roboter auch günstiger werden, was entsprechende Investitionen rentabler macht. So werden auch Biobauern von der Weiterentwicklung in der konventionellen Produktion profitieren.

Zudem werden sowohl die Verkaufspreise als auch der Marktdruck für Biogemüse stabil bleiben.

Schließlich werden Unkräuter immer resistenter gegen Pestizide, was konventionelle Landwirte dazu veranlasst, nach alternativen Lösungen zu suchen. Dies könnte sich positiv auf den Biosektor auswirken.

Diese Veränderungen werden die Entwicklung von Robotern und digitalen Tools sowie deren Einsatz in der Landwirtschaft fördern, vor allem bei kleineren Betrieben, die nur über begrenzte finanzielle Möglichkeiten verfügen.

Im Negativszenario wurden, wie von den Teilnehmern gewünscht, weniger Treiber des Wandels ausgewählt und diskutiert. In diesem Szenario stehen in Zukunft weniger qualifizierte Arbeitskräfte zur Verfügung, was die weitere Entwicklung von Robotern und anderen digitalen Tools, die Fachkenntnisse erfordern, sehr schwierig machen wird. Darüber hinaus wird das Verhältnis von Kosten und Effizienz der digitalisierten Unkrautregulierung unverändert bleiben. Das bedeutet, dass die Investitionen der

Landwirte, vor allem der kleineren, weiterhin ein wichtiges Hindernis für die Einführung bleiben werden. Außerdem wird der Marktdruck zunehmen, möglicherweise aufgrund einer weiteren Liberalisierung der Märkte.

Dieses Szenario führt dazu, dass Roboter und andere digitale Tools für die Unkrautbekämpfung nicht weiterentwickelt werden, was eine digitalisierte Unkrautbekämpfung in großem Maßstab verunmöglicht. Außerdem wird angenommen, dass der Gemüsesektor relativ unrentabel wird und dass die Landwirte stattdessen zur Milchproduktion zurückkehren werden.

DISKUSSION ÜBER DIE POLITIK

Im positiven Szenario produzieren die Landwirte mit weniger Arbeitsaufwand qualitativ hochwertigere Produkte (da sie weniger Konkurrenz durch Unkraut haben), was auch ihren wirtschaftlichen Ertrag erhöht. Zudem wird ihre Arbeit leichter fallen. Diese Vorteile sollten den Landwirten und der Gesellschaft besser kommuniziert werden.

Vor allem für kleinere Betriebe, entstehen jedoch erhebliche Investitionskosten. Eine Möglichkeit, dieses Problem zu verringern, ist die gemeinschaftliche Nutzung von Robotern oder anderen Technologien durch Landwirte. Eine weitere Möglichkeit besteht darin, die Option des Mietens oder Leasings zu fördern, ähnlich wie bei Personenwagen. Vor allem kleinere Betriebe dürften sich für diese Option entscheiden. Gleichzeitig wird aber die Abhängigkeit dieser Betriebe erhöht. Dieses Problem sollte von der Politik und den Landwirtschaftsakteuren stärker berücksichtigt werden.

Das Problem der Abhängigkeiten gilt auch für die Frage des Datenschutzes. Die Landwirte wünschen sich Datenhoheit, d. h., dass die Daten bei ihnen bleiben. Es wurde erörtert, dass die Politik die öffentliche Debatte zum Thema Datenschutz fördern sollte und dass die mit der Politik verbundenen Ziele für alle deutlicher gemacht werden sollten.

Darüber hinaus könnte das Hacken von digitalen Tools verhängnisvoll sein. Um dies zu verhindern, müssen die Geräte gesichert werden. Große Roboter sollten immer überwacht werden. Außerdem bleibt die

technische Weiterentwicklung ungewiss, da die Bedingungen (Wetter, Boden usw.) stark variieren. Dies bedeutet, dass die Roboter sehr anpassungsfähig sein müssen.

Im Negativszenario sind Roboter und andere digitale Tools nicht leistungsfähig genug. Dies eröffnet Möglichkeiten für alternative Innovationen und kombinierte Verfahren (z. B. Elektrizität, Fernerkundung, Vorhersagemodelle usw.). Dadurch wird das Innovationspotenzial in der Landwirtschaft stimuliert, was von der öffentlichen Politik aktiv unterstützt werden sollte, wobei die spezifischen Schweizer Bedingungen (z. B. Hanglagen usw.), die den Einsatz von Robotern auf den Feldern erschweren, zu berücksichtigen sind.

Dadurch werden traditionelle Praktiken zur Unkrautregulierung wiederbelebt. Um zu den "Wurzeln" zurückzukehren, wird die Frage lauten: *"Wie kann ich das Unkraut mechanisch bekämpfen?"* In der Tat ist dies eine Gelegenheit, sich Wissen oder "technisches Know-how" anzueignen, das in den letzten Jahrzehnten durch den Einsatz von Herbiziden die kein grosses Wissen erfordern, verloren gegangen ist. Dafür müssten jedoch spezialisierte Weiterbildungen im Bereich des Pflanzenschutzes ausgebaut werden.

Außerdem könnte der Marktdruck die Rentabilität des Gemüsesektors beeinträchtigen, wovon vor allem kleinere Landwirte betroffen sein werden. Dies muss ausgeglichen werden. Die Stakeholder wünschen sich, dass die Preisstützungsmechanismen beibehalten werden und deren Effizienz verbessert wird. Gleichzeitig besteht die Chance, die Flächen optimal zu nutzen und so die Effizienz zu steigern. Es wird auch angenommen, dass diese Situation zu einer gewissen Spezialisierung auf Nischen-, Spezialitäten- und hochwertige Produkte führen wird. Dies erfordert einer Politik, die die Diversifizierung der Produktion fördert.



This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

POLITISCHE MASSNAHMEN

Die Vorteile der Digitalisierung kommunizieren

- Den Landwirten und der Gesellschaft insgesamt die Vorteile der Digitalisierung in der Landwirtschaft vermitteln (z. B. weniger Arbeitskräfte, mehr heimische Produktion durch Steigerung der Wettbewerbsfähigkeit, geringerer Einsatz von Pestiziden usw.).
- Die Landwirtschaft in Bezug auf die Digitalisierung für andere sichtbar machen, auch durch Werbung.

Ein Umfeld schaffen, das mehr Offenheit für Innovationen zulässt

- Weitere Innovationsförderung, insbesondere im Bereich der Technik; Förderung von Innovationen mit Rücksicht auf die Schweizer Verhältnisse (z.B. Hanglage, etc.).
- Fragen des Datenschutzes (stärker) thematisieren; die öffentliche Diskussion über den Datenschutz fördern und die damit verbundenen politischen Ziele klarer machen.
- Die Geräte müssen sicher sein, damit sie nicht gehackt werden können; die Entwicklung eines gesetzlichen Rahmens wäre in dieser Hinsicht hilfreich.
- Weitere Verringerung des Einsatzes von Pestiziden, z. B. durch Verbot der giftigsten Pestizide und/oder Entwicklung eines spezifischen Steuersystems, wodurch innovative Alternativen gefördert werden.

Digitale Spezialist*innen in Lehre, Beratung und Agrarjournalismus einbinden

- Entwicklung von Weiterbildungsangeboten für Landwirt*innen zur Optimierung des Pflanzenschutzes.
- Die Attraktivität der Agrarrobotik "verkaufen", z.B. im Rahmen von Schulungen, Praktika, etc.

Wirtschaftliche Bedingungen der Digitalisierung verbessern

- Verringerung der wirtschaftlichen Belastung von Kleinbetrieben, z.B. durch die Förderung von Roboter-Miete oder -Leasing, das besonders für Kleinbetriebe attraktiv wäre.
- Unterstützung der Effizienzsteigerung zur Erhaltung der Wettbewerbsfähigkeit der Schweiz, z.B. durch die Umsetzung von Subventionen für besondere Investitionen, auch im Bereich der Digitalisierung.
- Unterstützung der Preise für Biogemüse, um die Lebensfähigkeit der Schweizer Gemüsebetriebe zu erhalten.

Eine weitere Diversifizierung der Fruchtfolgen und der landwirtschaftlichen Aktivitäten fördern.

- Kleine Betriebe, die nicht digitalisieren wollen, sollten sich anders orientieren (z.B. Gastronomie, Tourismus, Direktvermarktung, etc.).
- Förderung einer weiteren Diversifizierung der landwirtschaftlichen Betriebe, z.B. durch Direktzahlungen, um sowohl diversifizierte Fruchtfolgen zu erreichen als auch "zusätzliche Aktivitäten" wie Agrotourismus zu fördern.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy-makers on how to support digitalisation in the context of weed control on vegetable organic farms in Switzerland.

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Ψηφιακές Υπηρεσίες για Αγροτικές Κοινότητες

Η παρακάτω έκθεση πολιτικής είναι αποτέλεσμα του Ζωντανού Εργαστηρίου (ΖΕ) 'Ψηφιακές Υπηρεσίες για Αγροτικές Κοινότητες' που λειτουργεί στο πλαίσιο του ευρωπαϊκού έργου DESIRA H2020. Ο στόχος του Ζωντανού Εργαστηρίου είναι ο προσδιορισμός του αντίκτυπου αγροτικών ψηφιακών εργαλείων και υπηρεσιών σε μια ομάδα καπνοκαλλιεργητών που δραστηριοποιούνται στην αγροτική περιοχή της πόλης της Κατερίνης στην κεντρική-βόρεια Ελλάδα. Το ΖΕ προσπαθεί να εντοπίσει υπάρχοντα εμπόδια στην προσπάθεια των καλλιεργητών να επιτύχουν μια ομαλή μετάβαση από την καλλιέργεια καπνού σε άλλους τύπους καλλιεργειών με την υποστήριξη νέων ψηφιακών αγροτικών εργαλείων και υπηρεσιών. Ακόμη, το ΖΕ επιχειρεί να φέρει στην επιφάνεια τομείς ή πτυχές πολιτικής που στερούνται επαρκούς υποστήριξης και γι' αυτό τον σκοπό μέσα από τις δράσεις του ΖΕ δημιουργήθηκαν δύο μελλοντικά σενάρια που αποτυπώνουν τις πιθανές μελλοντικές επιπτώσεις των ψηφιακών εργαλείων στην γεωργική δραστηριότητα της περιοχής. Τα σενάρια που αναπτύχθηκαν χρησιμοποιούνται ως βάση πάνω στην οποία προτείνεται μια σειρά επιλογών πολιτικής, λαμβάνοντας υπόψη τις ιδιαιτερότητες και τα χαρακτηριστικά του τόπου. Συνοπτικά, οι προτεινόμενες πολιτικές στοχεύουν στην προώθηση μηχανισμών υποστήριξης, εκπαίδευσης και κατάρτισης των τοπικών αγροτικών κοινοτήτων, την δημιουργία χρηματοδοτικών μέσων και κινήτρων για την δημιουργία νέων αγορών και τέλος, στην αύξηση της διαφάνειας και διευκόλυνση των διαδικασιών που σχετίζονται με τα διακαιώματα χρήσης και κτήσης αγροτικών δεδομένων που προκύπτουν και συλλέγονται μέσα από την ψηφιοποίηση της αγροτικής δραστηριότητας.

ΕΙΣΑΓΩΓΙΚΟ ΣΗΜΕΙΩΜΑ

Η Ελλάδα αντιμετωπίζει μακροχρόνιες διαρθρωτικές ελλείψεις, οι οποίες σε συνδυασμό με τις κοινωνικές και δημογραφικές ιδιομορφίες της χώρας εμποδίζουν την ταχεία εφαρμογή πολιτικών και δράσεων ψηφιακού μετασχηματισμού. Ο ψηφιακός μετασχηματισμός έχει ορισθεί ως άμεση ανάγκη και αποτελεί προτεραιότητα για την μετάβαση της Ελλάδας σε μια νέα ψηφιακή εποχή. Στο πλαίσιο αυτό έχει αναπτυχθεί μια εθνική στρατηγική που θα οδηγήσει στην ευθυγράμμιση των εθνικών στόχων με Ευρωπαϊκές πολιτικές ορόσημα, για την ψηφιακή διαμόρφωση της κοινωνίας και οικονομίας. Χαρακτηριστικά, τον Απρίλιο του 2021, η Ελλάδα ανακοίνωσε με την υποστήριξη της Ευρωπαϊκής Επιτροπής το *Εθνικό Σχέδιο Ανάκαμψης και Ανθεκτικότητας Ελλάδα 2.0*, το οποίο αναμένεται να συμβάλει σημαντικά στον ψηφιακό μετασχηματισμό της χώρας, δεσμεύοντας περίπου το 25% του προβλεπόμενου προϋπολογισμού σε στόχους ψηφιακού μετασχηματισμού. Όσον αφορά τις αγροτικές και γεωργικές περιοχές της χώρας, η Ελλάδα αντιμετωπίζει ένα από τα μεγαλύτερα ψηφιακά χάσματα στην ΕΕ ανάμεσα σε αστικές και αγροτικές περιοχές. Η παρούσα έκθεση βασίζεται στο Ζωντανό

Εργαστήριο (ΖΕ) "Ψηφιακές υπηρεσίες για αγροτικές κοινότητες" και δραστηριοποιείται στον Τρίλοφο Πιερίας, μια κοινότητα που υπάγεται στο δήμο Κατερίνης, στη Κεντρική-Βόρεια Ελλάδα. Η περιοχή έχει μακρά παράδοση στην καλλιέργεια καπνού, αν και τα τελευταία χρόνια η θέση των τοπικών καπνοκαλλιεργητών στην εφοδιαστική αλυσίδα έχει αποδυναμωθεί σημαντικά. Το ΖΕ εμβαθύνει στον εντοπισμό ψηφιακών υπηρεσιών και λειτουργιών και προτείνει ψηφιακές λύσεις και τρόπους εφαρμογής τους σε μια ομάδα καπνοκαλλιεργητών, οι οποίοι εξετάζουν τη σταδιακή μετάβαση από την καλλιέργεια καπνού σε άλλους τύπους καλλιεργειών οπωροκηπευτικών. Η εισαγωγή ψηφιακών λύσεων διαμορφώνει νέες αλληλεπιδράσεις μεταξύ των καλλιεργητών και της γεωργικής γης και ανοίγει το δρόμο για νέες γεωργικές δραστηριότητες, αναδιαμορφώνοντας τη δυναμική της αγροτικής καλλιέργειας στον τόπο, παρουσιάζοντας όμως, ταυτόχρονα, και νέες προκλήσεις και εμπόδια στη διαδικασία ομαλής μετάβασης σε μια ψηφιακή γεωργία.



ΜΕΘΟΔΟΛΟΓΙΚΗ ΠΡΟΣΕΓΓΙΣΗ

Για την διεξαγωγή των μελλοντικών σεναρίων στα πλαίσια του ΖΕ, το ακόλουθο ερώτημα χρησιμοποιήθηκε ως αφετηρία 'Ποιος μπορεί να είναι ο αντίκτυπος των ψηφιακών εργαλείων την επόμενη δεκαετία (2030) στις αγροτικές δραστηριότητες και την οικονομική ανάπτυξη του Τριλόφου Πιερίας;'.



Η ΔΗΜΙΟΥΡΓΙΑ ΜΕΛΛΟΝΤΙΚΩΝ ΣΕΝΑΡΙΩΝ ΕΠΙΤΡΕΠΕΙ ΤΟΝ ΕΝΤΟΠΙΣΜΟ ΕΛΛΕΙΨΕΩΝ ΣΕ ΕΠΙΠΕΔΟ ΠΟΛΙΤΙΚΗΣ ΚΑΙ ΤΗΝ ΤΑΥΤΟΧΡΟΝΗ ΑΞΙΟΛΟΓΗΣΗ ΚΑΙ ΕΛΕΓΧΟ ΤΗΣ ΑΠΟΤΕΛΕΣΜΑΤΙΚΟΤΗΤΑΣ ΠΟΛΙΤΙΚΩΝ ΠΟΥ ΒΡΙΣΚΟΝΤΑΙ ΣΕ ΙΣΧΥ.

Η δημιουργία των μελλοντικών σεναρίων είναι η τελευταία σε μια σειρά από δράσεις όπως η αξιολόγηση παρελθουσών αναγκών και προσδοκιών, ο ορισμός του συνόλου των φορέων αλλαγής (drivers of change) σε σχέση με την χρήση ψηφιακών εργαλείων στις αγροτικές δραστηριότητες, καθώς και η δημιουργία και ανάδειξη ενός εύρους μελλοντικών θετικών και αρνητικών προβλέψεων σχετικών με τον αντίκτυπο της ψηφιοποίησης στη γεωργία και στην γενικότερη οικονομική ανάπτυξη στον Τρίλοφο Πιερίας.

Υπό το πρίσμα της προσέγγισης του ψηφιακού μετασχηματισμού, όπως αυτός είναι αντιληπτός από το έργο DESIRA, το σύνολο των δράσεων του ΖΕ συνέβαλε στην αποτύπωση ενός ευρύτερου συστήματος κοινωνικών-τεχνολογικών-φυσικών στοιχείων και των μεταξύ τους σχέσεων. Η αποτύπωση αυτή ήταν το πρώτο και βασικό βήμα για να ξεδιπλωθούν όλες οι προαναφερθείσες δράσεις του ΖΕ

ΔΗΜΙΟΥΡΓΙΑ ΣΕΝΑΡΙΩΝ

Ένα αρνητικό και ένα θετικό μελλοντικό σενάριο ήταν το αποτέλεσμα της συν-διαμόρφωσης που προέκυψε μέσα από μια σειρά εργαστηρίων που πραγματοποιήθηκαν με την παρουσία μιας διαφοροποιημένης ομάδας συμμετεχόντων. Τα μελλοντικά σενάρια αποτυπώνουν με αφηγηματικό τρόπο τα πλεονεκτήματα, τα μειονεκτήματα αλλά και μελλοντικές ευκαιρίες και απειλές που ενδέχεται να προκύψουν από τον αντίκτυπο του ψηφιακού μετασχηματισμού στην γεωργική οικονομία της περιοχής του Τριλόφου.

Το θετικό σενάριο εκτυλίσσεται γύρω από

ένα μέλλον όπου οι αγροτικές κοινότητες που βρίσκονται στην περιοχή είναι σε θέση να αξιοποιήσουν τις εγκαθιδρυμένες ψηφιακές υποδομές της περιοχής και να 'χτίσουν' μια τοπική κουλτούρα που προάγει την ευρύτερη αύξηση του ψηφιακού αλφαριθμητισμού της περιοχής και την ανάπτυξη των ψηφιακών δεξιοτήτων και ικανοτήτων όχι μόνο των αγροτών αλλά και άλλων κοινωνικών ομάδων. Επίσης, ο 'εκσυγχρονισμός' της γεωργικής καλλιέργειας μέσω της χρήσης ψηφιακών τεχνολογιών θα προσελκύσει νεότερα ηλικιακά άτομα στις γεωργικές επιχειρήσεις και σταδιακά θα οδηγήσει στην επέκταση των υποδομών και των υπηρεσιών, την επανατοποθέτηση των τοπικών γεωργικών επιχειρήσεων στις αγροδιατροφικές αλυσίδες αξίας, την προώθηση μιας ευρύτερης κουλτούρας καινοτομίας στην περιοχή και παράλληλα την αύξηση του γεωργικού εισοδήματός τους και την βελτίωση των συνθηκών εργασίας.

Το αρνητικό σενάριο περιγράφει ένα μέλλον όπου η ψηφιακή μετάβαση δεν μπορεί να επιτευχθεί. Η περαιτέρω ανάπτυξη και υιοθέτηση ψηφιακών εργαλείων και τεχνολογιών είναι δύσκολη αρχικά λόγω της έλλειψης ενός οργανωμένου επιχειρηματικού σχεδίου που θα στοχεύει στην υποστήριξη παροχής ψηφιακών υπηρεσιών και υποδομών, καθώς και λόγω της επιφυλακτικής στάσης των τοπικών κοινοτήτων ως προς την προσαρμογή τους σε ένα ψηφιακό περιβάλλον. Επιπροσθέτως καταλυτικό ρόλο έχουν και παράγοντες όπως η αποτυχία στην δημιουργία αμοιβαία επωφελών συνεργασιών με τους παρόχους της ψηφιακής τεχνολογίας, αλλά και η διαφορετική αντίληψη των τοπικών αγροτικών κοινοτήτων σχετικά με τα προβλεπόμενα οφέλη της χρήσης ψηφιακών εργαλείων στις γεωργικές πρακτικές τους και την δυνατότητα αύξησης της ανταγωνιστικότητας τους στο άμεσο μέλλον.

ΚΥΡΙΕΣ ΕΠΙΣΗΜΑΝΣΕΙΣ

Κατά την πραγματοποίηση των συναντήσεων του ΖΕ, για την ανάπτυξη των μελλοντικών σεναρίων συνέβαλε μια ευρεία ομάδα συμμετεχόντων που αποτελείται από άτομα που δραστηριοποιούνται στους τομείς της περιβαλλοντικής έρευνας, της αγροτικής παραγωγής και της γεωργίας, της παροχής τεχνολογικών και συμβουλευτικών

υπηρεσιών στην γεωργία, της γεωπονίας καθώς και τοπικούς φορείς.

Τα σενάρια στη ουσία αποτελούν μια υποθετική αξιολόγηση του μέλλοντος του Τριλόφου Πιερίας, επιχειρώντας μια αποτύπωση του αντίκτυπου της ψηφιοποίησης στις γεωργικές δραστηριότητες.

Το 'σημείο εκκίνησης' στην διαδικασία διαμόρφωσης των σεναρίων περιστρέφεται γύρω από την ανάγκη των καπνοκαλλιεργητών να κάνουν μετάβαση σε νέες γεωργικές καλλιέργειες, τόσο από την άποψη του αντικειμένου (εγκαταλείποντας τα καπνά) όσο και από τη σκοπιά των καλλιεργητικών μεθόδων. Δοκιμάζουν νέες μεθόδους που θα συνεισφέρουν στην αύξηση των εισοδημάτων τους και θα βοηθήσουν εισαγωγή και εδραίωσή τους σε νέες αγροδιατροφικές αλυσίδες.

Ενώ η χρήση ψηφιακών αγροτικών εργαλείων είχε άμεσα θετικά αποτελέσματα στη γεωργική αποδοτικότητα, μέσω του συνεχή ελέγχου και της έγκαιρης παρακολούθησης της μετάβασής στις νέες καλλιέργειες, παρόλα αυτά παρατηρήθηκε σημαντική έλλειψη ψηφιακών γνώσεων και κατάρτισης των καλλιεργητών και ελλιπής περαιτέρω αξιοποίηση των γεωργικών δεδομένων.

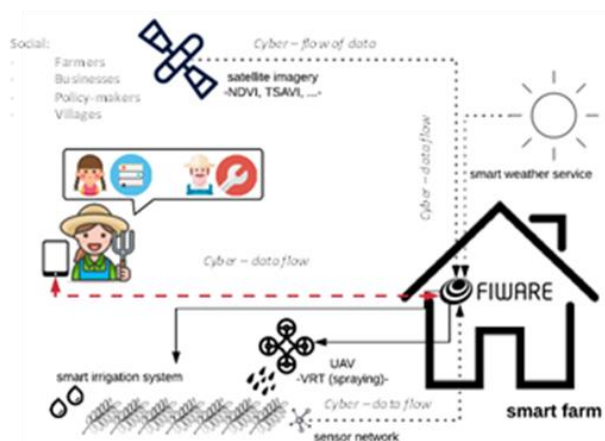
Άμεσο συμπέρασμα των παραπάνω, είναι πως καθ' όλη τη διάρκεια του πιλοτικού σταδίου που πραγματοποιείται η εγκατάσταση ψηφιακών υποδομών και υιοθέτηση των γεωργικών συστημάτων, είναι κρίσιμη η παράλληλη στήριξη των καλλιεργητών με κατάλληλα προγράμματα κατάρτισης. Η ανάπτυξη των ψηφιακών δεξιοτήτων των καλλιεργητών είναι θεμελιώδης παράγοντας για επαρκή ανταπόκριση στις τεχνικές απαιτήσεις της 'ψηφιακής' γεωργίας.



Η ΣΤΗΡΙΞΗ ΤΩΝ ΚΑΛΛΙΕΡΓΗΤΩΝ ΓΙΑ ΤΗΝ ΑΠΟΚΤΗΣΗ ΕΠΑΡΚΟΥΣ ΤΕΧΝΙΚΗΣ ΚΑΤΑΡΤΙΣΗΣ ΣΕ ΣΥΝΔΥΑΣΜΟ ΜΕ ΤΗΝ ΠΑΡΟΧΗ ΚΙΝΗΤΡΩΝ ΣΕ ΙΔΙΩΤΙΚΟΥΣ ΠΑΡΟΧΟΥΣ ΑΓΡΟΤΙΚΩΝ ΚΑΙ ΣΥΜΒΟΥΛΕΥΤΙΚΩΝ ΥΠΗΡΕΣΙΩΝ ΕΙΝΑΙ ΠΑΡΑΓΟΝΤΕΣ ΖΩΤΙΚΗΣ ΣΗΜΑΣΙΑΣ ΓΙΑ ΤΗΝ ΣΤΟΧΕΥΜΕΝΗ ΚΑΙ ΤΑΧΥΤΕΡΗ ΥΙΟΘΕΤΗΣΗ ΨΗΦΙΑΚΩΝ ΓΕΩΡΓΙΚΩΝ ΛΥΣΕΩΝ.

Ακόμη μια σημαντική πτυχή που εντοπίστηκε αφορά την μεγάλη εξάρτηση των καλλιεργητών από τους παρόχ συμβουλευτικών και τεχνολογικών υπηρεσιών. Το γεγονός αυτό σχετίζεται στενά με τις περιορισμένες ψηφιακές δεξιότητες και την ελλιπή κατάρτιση των καλλιεργητών και αποτελεί ένα σημαντικό εμπόδιο σε μια βιώσιμη ψηφιακή γεωργική μετάβαση του τόπου. Η χειραφέτηση των τοπικών αγροτικών κοινοτήτων μπορεί να επέλθει μέσω της δημιουργίας μηχανισμών που θα επιτρέψουν τη μεταφορά γνώσεων και δεξιοτήτων από τους πάροχους ψηφιακών υπηρεσιών προς τους τελικούς χρήστες. Ως απώτερος στόχος τίθεται η δυνατότητα των καλλιεργητών να επεξεργάζονται τις πληροφορίες που λαμβάνουν από τα γεωργικά δεδομένα και τελικά η μεγαλύτερη αυτονομία τους στην διαδικασία λήψης αποφάσεων όσον αφορά την αγροτική τους δραστηριότητα.

Παράλληλα, αξίζει να επισημανθεί το αυξανόμενο ενδιαφέρον τοπικών επιχειρηματικών παραγόντων, που δραστηριοποιούνται σε κλάδους όπως η μεταποίηση τροφίμων, η εστίαση και ο τουρισμός, για περεταίρω ανάπτυξη των ψηφιακών τεχνολογιών στην περιοχή. Η στήριξη της τοπικής αλυσίδας αξίας με μέτρα που προωθούν την αύξηση της αποδοτικότητας και τις διακλαδικές συνεργίες στον αγροδιατροφικό και του συσχετιζόμενους τομείς και επιτρέπουν στους τοπικούς παραγωγούς να επεκτείνουν τις πωλήσεις τους στα υφιστάμενα τοπικά δίκτυα είναι ζητούμενο ενός κατάλληλου μείγματος πολιτικής που στηρίζει παράλληλα την αγροτική καλλιέργεια, τις τοπικές αγορές και την ψηφιακή μετάβαση.





This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

ΣΤΟΧΟΙ ΜΕΛΛΟΝΤΙΚΗΣ ΠΟΛΙΤΙΚΗΣ

Προώθηση προγραμμάτων κατάρτισης και συμβουλευτικής υποστήριξης για ενδιαφερόμενους γεωργούς

- Ανάπτυξη και προώθηση υποστηρικτικών προγραμμάτων που θα επιτρέψουν την εφαρμογή ψηφιακών στρατηγικών μέσω της εκπαίδευσης των αγροτών σε νέες τεχνολογίες καθώς και η διασφάλιση της συνδεσιμότητας, αλλά και της οικονομικής προσβασιμότητας είναι πρωτεύουσα ανάγκη για την επίτευξη της ψηφιακής γεωργικής μετάβασης.
- Ανάπτυξη στοχευμένων πολιτικών που θα επικεντρωθούν στην παροχή κινήτρων στην τοπική κοινωνία και θα ωθούν προς την υιοθέτηση νέων ψηφιακών τεχνολογιών, ενώ παράλληλα θα παρέχουν συμπληρωματικά εκπαιδευτικά προγράμματα για την αύξηση των ψηφιακών δεξιοτήτων των ενδιαφερόμενων αγροτών.
- Σχεδιασμός στοχευμένων πολιτικών που θα θέτουν τα θεμέλια πάνω στα οποία η ψηφιακή γεωργία στις αγροτικές περιοχές θα επεκταθεί ώστε να επιτευχθεί η αύξηση της παραγωγικότητας των γεωργικών εκμεταλλεύσεων και η ενίσχυση της ανταγωνιστικότητας των μικρών γεωργικών μονάδων.

Οικονομική στήριξη του δημόσιου και ιδιωτικού τομέα για την δημιουργία νέων αγορών

- Διεύρυνση του πεδίου εφαρμογής των πολιτικών πέρα από τις άμεσες πληρωμές σε αγρότες και καλλιεργητές που θα στοχεύουν στην παροχή κινήτρων στον ιδιωτικό τομέα με την προοπτική δημιουργίας κερδοφόρων αγορών στους τομείς των υπηρεσιών γεωργικών εφαρμογών, παροχής συμβουλευτικών υπηρεσιών και παροχής ψηφιακών εργαλείων και υποδομών.
- Διευκόλυνση για την σύναψη συμπράξεων δημόσιου και ιδιωτικού τομέα σε κοινοτικό-τοπικό επίπεδο για την δημιουργία συνεργιών που θα προσφέρουν στην καλύτερη αντιμετώπιση των αναγκών τόσο των γεωργών όσο και των αγροτικών κοινοτήτων. Οι κοινοτικές-ιδιωτικές συμπράξεις έχουν την δυνατότητα να παρέχουν περισσότερο προσανατολισμένα προς τους αγρότες μοντέλα παροχής υπηρεσιών για τους ανα τόπους αγροτικές δραστηριότητες.

Αύξηση της διαφάνειας σχετικά με τα δικαιώματα χρήσης της πληροφορίας και των γεωργικών δεδομένων

- Σχεδιασμός πολιτικών με σαφή εστίαση στην άρση των πιθανών εμποδίων εισόδου που σχετίζονται με τα δικαιώματα χρήσης δεδομένων και αποθαρρύνουν την εμπλοκή των ενδιαφερόμενων γεωργών στα ψηφιακά συστήματα.
- Στόχευση προς την αμβλύωση των ασυμμετριών που προκύπτουν μεταξύ χρηστών και παρόχων ψηφιακών υπηρεσιών όσον αφορά την κυριότητα και τα δικαιώματα χρήσης και διαχείρισης των αγροτικών δεδομένων.
- Σχεδιασμός πολιτικών που αντιμετωπίζουν τα δεδομένα ως αγαθό και να διασφαλίζουν τον σαφή, δίκαιο και αμερόληπτο τρόπο διαχείρισης τους από ιδιωτικούς πάροχους υπηρεσιών, τοπικούς φορείς καθώς και κοινοτικές και δημοτικές ενώσεις και δημοσίου φορείς.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalization in the context of Digital Services for Rural and Farmer Communities in Trilofos Pieria's, Central Greece.

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Πρακτικές για την Βιώσιμη Διαχείριση του Νερού

Το Ζωντανό Εργαστήριο (ΖΕ) 'Βιώσιμη Διαχείριση του Νερού' δραστηριοποιείται στην περιοχή των Τρικάλων. Αξιοποιεί τις ενεργό παρουσία της περιοχής σε δράσεις και πολιτικές σχετικές με την «Έξυπνη μετάβαση» και αποσκοπεί στην διερεύνηση του τρέχοντος και μελλοντικού αντίκτυπου που θα έχει μια ενδεχόμενη υιοθέτηση ψηφιακών τεχνολογιών στη βιώσιμη διαχείριση του νερού. Η παρούσα συνοπτική έκθεση πολιτικών έχει βασιστεί σε δύο μελλοντικά σενάρια που δημιουργήθηκαν μέσα από μια σειρά εργαστηρίων με την συνεργασία και συνεισφορά τοπικών φορέων και ενδιαφερομένων μερών της περιοχής των Τρικάλων. Τα δύο μελλοντικά σενάρια (ένα θετικό και ένα αρνητικό) χρησιμεύουν ως ένα σημείο αναφοράς που επιτρέπει την προβολή των ελλείψεων, ευκαιριών αλλά και μελλοντικών κινδύνων στη διασύνδεση ψηφιακά εργαλεία- διαχείριση νερού, ενώ επιπλέον διευκολύνουν τον εντοπισμό καίριων πεδίων για την χάραξη μελλοντικών πολιτικών. Η άμβλυνση του χάσματος ψηφιακών δεξιοτήτων της περιοχής, η προώθηση της κυκλικής οικονομίας, η "τοπικοποίηση" των εθνικών και ευρωπαϊκών πολιτικών και η παροχή κινήτρων στις τοπικές Μικρές και Μεσαίες Επιχειρήσεις (ΜΜΕ) είναι μερικά από τα χαρακτηριστικά πεδία που αφορούν τον σχεδιασμό μελλοντικής πολιτικής που εντοπίστηκαν μέσα από τις δράσεις του Ζωντανού Εργαστηρίου.

ΕΙΣΑΓΩΓΙΚΟ ΣΗΜΕΙΩΜΑ

Ο ψηφιακός μετασχηματισμός έχει ορισθεί ως άμεση ανάγκη και αποτελεί προτεραιότητα για την μετάβαση της Ελλάδας σε μια νέα ψηφιακή εποχή. Στο πλαίσιο αυτό έχει αναπτυχθεί μια εθνική στρατηγική που θα οδηγήσει στην ευθυγράμμιση των εθνικών στόχων με Ευρωπαϊκές πολιτικές ορόσημα, για την ψηφιακή διαμόρφωση της κοινωνίας και οικονομίας. Η Ελλάδα αντιμετωπίζει μακροχρόνιες διαρθρωτικές ελλείψεις, οι οποίες σε συνδυασμό με τις κοινωνικές και δημογραφικές ιδιομορφίες της χώρας εμποδίζουν την ταχεία εφαρμογή πολιτικών και δράσεων ψηφιακού μετασχηματισμού. Γεγονός που αντικατοπτρίζεται και στις σημαντικά χαμηλές θέσεις της χώρας στον δείκτη 'Ψηφιακής Οικονομίας και Κοινωνίας' (DESI) και στον δείκτη 'Ψηφιακής Ετοιμότητας' (NRI), σε σύγκριση με άλλα κράτη μέλη της ΕΕ. Σχετικά με τα επίπεδα ψηφιοποίησης στον αγροτικό τομέα, η Ελλάδα ακολουθεί ανάλογη πορεία εφαρμόζοντας οριζόντια μέτρα εθνικής κλίμακας με σκοπό να καλυφθεί το χάσμα ψηφιακής αναδιάρθρωσης που υπάρχει συγκριτικά με την υπόλοιπη ΕΕ. Ωστόσο, απαιτείται περαιτέρω έμφαση στις επιμέρους προκλήσεις που αντιμετωπίζουν οι αγροτικές περιοχές, καθώς υπάρχει έλλειψη

'μηχανισμών' που να επιτρέπουν την άμβλυνση των εκάστοτε τοπικών ιδιομορφιών και την αξιοποίηση της τοπικής εμπειρίας για την χάραξη πολιτικών σε επίπεδο περιφέρειας.

Η παρούσα έκθεση είναι βασισμένη στο Ζωντανό Εργαστήριο (ΖΕ) με τίτλο 'Βιώσιμη Διαχείριση του Νερού', το οποίο επικεντρώνεται στην εύρεση ψηφιακών πρακτικών για την βελτίωση της διαχείρισης του νερού στην περιφέρεια Τρικάλων. Η επάρκεια των υδάτινων πόρων της περιοχής, για την κάλυψη των γεωργικών αλλά και των καθημερινών αναγκών των πολιτών, έχει καταστήσει τα θέματα βιωσιμότητας του νερού τομέα δευτέρας προτεραιότητας για πολλά ενδιαφερόμενα μέρη της περιοχής. Ωστόσο, φορείς της τοπικής αυτοδιοίκησης έχουν εντοπίσει ανεπάρκειες και ελλείψεις στις τρέχουσες πρακτικές κατανάλωσης του νερού που καθιστούν την διαχείριση του νερού μη βιώσιμη μακροπρόθεσμα. Στα πλαίσια του ΖΕ εντοπίστηκαν επίσης ζητήματα που αφορούν α) τον μεγάλο κατακερματισμό αρμοδιοτήτων μεταξύ των τοπικών φορέων διαχείρισης του νερού, β) την έλλειψη ενός ολοκληρωμένου περιφερειακού σχεδίου δράσης, γ) την ανεπάρκεια στο εθνικό και περιφερειακό

κανονιστικό πλαίσιο για την διαχείριση των υδάτων. Οι δράσεις του ΖΕ συνέβαλαν στην ιεράρχηση άμεσων στόχων και στον καθορισμό χαρακτηριστικών ψηφιακών εργαλείων που αποσκοπούν στην ενίσχυση του διοικητικού συντονισμού αλλά και την ευαισθητοποίηση του κοινού όσον αφορά τις πρακτικές βιώσιμης διαχείρισης του νερού στην περιοχή.

ΜΕΘΟΔΟΛΟΓΙΚΗ ΠΡΟΣΕΓΓΙΣΗ

Το ακόλουθο κεντρικό ερώτημα 'Πώς μπορούν τα ψηφιακά εργαλεία να επηρεάσουν την διαχείριση του νερού όσον αφορά τις αγροτικές και αστικές ανάγκες των Τρικάλων μέχρι το 2031;' υιοθετήθηκε ως αφετηρία για την δημιουργία δύο μελλοντικών σεναρίων με ορίζοντα δεκαετίας. Τα σεσάρια χρησιμοποιούνται ως ένα σημείο αναφοράς για την ανάδειξη πεδίων και στόχων στην χάραξη πολιτικής. Η δημιουργία των μελλοντικών σεναρίων είναι η τελευταία σε μια σειρά από δράσεις όπως η αξιολόγηση παρελθουσών αναγκών και προσδοκιών, ο ορισμός του συνόλου των φορέων αλλαγής (drivers of change) σε σχέση με την χρήση ψηφιακών εργαλείων στην διαχείριση του νερού, καθώς και η δημιουργία και ανάδειξη ενός εύρους μελλοντικών θετικών και αρνητικών προβλέψεων σχετικών με τον αντίκτυπο της ψηφιοποίησης στη διαχείριση του νερού στα Τρίκαλα.



Η δημιουργία σεναρίων παίρνει τη μορφή μελλοντικής αξιολόγησης σε ένα μέλλον όπου οι επιπτώσεις της χρήσης των ψηφιακών τεχνολογιών έχουν αναδιαμορφώσει τον τρόπο που αλληλοεπιδρά η κοινωνία με την τεχνολογία και το φυσικό περιβάλλον.

Υπό το πρίσμα της προσέγγισης του ψηφιακού μετασχηματισμού, όπως αυτός είναι αντιληπτός από το έργο DESIRA, το σύνολο των δράσεων του ΖΕ συνέβαλε στην αποτύπωση ενός ευρύτερου συστήματος κοινωνικών-τεχνολογικών-φυσικών στοιχείων και των μεταξύ τους σχέσεων. Η αποτύπωση αυτή ήταν το πρώτο και βασικό βήμα για να ξεδιπλωθούν όλες οι

προαναφερθείσες δράσεις του ΖΕ.

ΔΗΜΙΟΥΡΓΙΑ ΣΕΝΑΡΙΩΝ

Ένα αρνητικό και ένα θετικό μελλοντικό σενάριο ήταν το αποτέλεσμα της συν-διαμόρφωσης που προέκυψε μέσα από μια σειρά εργαστηρίων που πραγματοποιήθηκαν με την συμμετοχή διαφόρων ενδιαφερομένων μερών που δραστηριοποιούνται στην περιοχή των Τρικάλων. Τα μελλοντικά σεσάρια αποτυπώνουν με αφηγηματικό τρόπο τα πλεονεκτήματα, τα μειονεκτήματα αλλά και μελλοντικές ευκαιρίες και απειλές που μπορούν να προκύψουν από τον αντίκτυπο της ψηφιακής μετάβασης στη διαχείριση του νερού.

Το θετικό σενάριο παρακολουθεί το μέλλον μιας οικογένειας που παίρνει την απόφαση να μετ-εγκατασταθεί από την Αθήνα στην περιοχή των Τρικάλων, σχεδιάζοντας να αξιοποιήσει έκταση γης που έχει στην κατοχή και να ασχοληθεί με την αγροτική καλλιέργεια. Η άρδευση της γης τους αποτελεί ζήτημα ζωτικής σημασίας τόσο από πλευράς ποσότητας νερού, όσο και από πλευράς του σχετικού κόστους. Προς ευχάριστη έκπληξη, η ένταξη τους στο αγροτικό επιχειρείν των Τρικάλων και η έναρξη της γεωργικής τους δραστηριότητας διευκολύνεται σημαντικά από την ψηφιακή ετοιμότητα που διακρίνει τα Τρίκαλα μέσω των τεχνολογιών που έχουν υιοθετηθεί και που σταδιακά οικοδομούνται τις τελευταίες δύο δεκαετίες. Τα σχετικά εργαλεία και οι υποδομές δίνουν σημαντική ώθηση στην ψηφιακή μετάβαση της περιοχής, ενισχύοντας τους μηχανισμούς ένταξης του κοινού στη διαδικασία λήψης αποφάσεων σε τοπικό επίπεδο και επιτρέποντας νέες χρήσιμες υπηρεσίες για τους αγρότες, τους πολίτες και τις επιχειρήσεις της περιοχής, επιταχύνοντας παράλληλα τη διαδικασία του Έξυπνου Μετασχηματισμού της περιοχής των Τρικάλων.

Αλλά και το αρνητικό σενάριο εκτυλίσσεται γύρω από ένα μέλλον όπου η ψηφιοποίηση των υπηρεσιών στην περιοχή έχει επιτευχθεί σε υψηλό βαθμό. Ωστόσο, η διαδικασία αυτή και η 'μεταμόρφωση' των Τρικάλων σε 'έξυπνη' πόλη έχουν αρνητικό αντίκτυπο στην κοινωνία και τη γεωργία της περιοχής. Το σενάριο παρουσιάζεται μέσα από τα μάτια

ενός νέου αγρότη που μετακόμισε στην αγροτική περιοχή των Τρικάλων το 2027, επιλέγοντας να ξεκινήσει μια νέα καλλιέργεια. Η υιοθέτηση ψηφιακών λύσεων για την αγροτική χρήση των υδάτινων πόρων όπως και για ένα ευρύ σύνολο αγροτικών δραστηριοτήτων είναι μια πάγια πολιτική που εφαρμόζουν οι φορείς της τοπικής αυτοδιοίκησης. Αυτό όμως δεν έχει γίνει μέσα από ένα ολοκληρωμένο σχέδιο ψηφιακού μετασχηματισμού, αλλά μάλλον με περισσότερο ή λιγότερο αποσπασματικές ενέργειες. Αυτή η προσέγγιση, σε συνδυασμό με το έντονα διαφοροποιημένο δημογραφικό προφίλ της περιοχής αποτελεί σημαντικό εμπόδιο για την βιώσιμη υιοθέτηση και αποδοχή των ψηφιακών τεχνολογιών, και οδηγεί τελικά σε έναν δυσλειτουργικό ψηφιακό μετασχηματισμό που δυσκολεύει την ένταξη νέων αγροτών στα ψηφιακά συστήματα, ενώ παράλληλα δεν διασφαλίζει την επαρκή κάλυψη των υπάρχοντων τοπικών αναγκών για μια αειφόρο διαχείριση του νερού.

ΚΥΡΙΕΣ ΕΠΙΣΗΜΑΝΣΕΙΣ

Στις συναντήσεις του Ζωντανού Εργαστηρίου για την ανάπτυξη των μελλοντικών σεναρίων συνέβαλε μια ευρεία ομάδα συμμετεχόντων που αποτελούνταν από άτομα που δραστηριοποιούνται στους τομείς της περιβαλλοντικής έρευνας, της αγροτικής παραγωγής και της γεωργίας, της δημόσιας διοίκησης αλλά και τοπικούς φορείς διαχείρισης του νερού στην περιφέρεια των Τρικάλων.

Μέσω της διαμόρφωσης των σεναρίων δόθηκε η δυνατότητα συζήτησης πάνω σε θέματα πολιτικών σχετικών με τη βιώσιμη διαχείριση του νερού.

Το πρώτο και κεντρικό σημείο που προέκυψε από τις συζητήσεις θίγει την έλλειψη κεντρικού σχεδιασμού στην διαχείριση των υδάτων ως απόρροια της ελλιπούς συνεργασίας των αρμόδιων διοικητικών φορέων. Δευτερευόντως, η έλλειψη οργανωμένης συλλογής και διαχείρισης δεδομένων είναι ακόμη ένας τομέας που παρουσιάζει 'κενά' πολιτικής και που δυνητικά μπορεί να συνεισφέρει σημαντικά στην διαδικασία λήψης τεκμηριωμένων αποφάσεων στο μέλλον.



Η ΑΝΑΠΤΥΞΗ ΤΩΝ ΨΗΦΙΑΚΩΝ ΔΕΞΙΟΤΗΤΩΝ ΤΩΝ ΤΟΠΙΚΩΝ ΚΟΙΝΟΤΗΤΩΝ ΑΠΟΤΕΛΕΙ ΣΗΜΑΝΤΙΚΟ ΠΑΡΑΓΟΝΤΑ ΓΙΑ ΤΗΝ ΕΠΙΤΕΥΞΗ ΠΟΛΙΤΙΚΩΝ ΠΑΡΕΜΒΑΣΕΩΝ ΠΟΥ ΣΤΟΧΕΥΟΥΝ ΣΤΗΝ ΒΙΩΣΙΜΗ ΔΙΑΧΕΙΡΙΣΗ ΤΟΥ ΝΕΡΟΥ ΜΕΣΩ ΤΗΣ ΨΗΦΙΑΚΗΣ ΜΕΤΑΒΑΣΗΣ ΤΩΝ ΤΡΙΚΑΛΩΝ.

Υπάρχει ωστόσο ανισορροπία στο ρυθμό υιοθέτησης των ψηφιακών λύσεων μεταξύ της πόλης των Τρικάλων και των γύρω αγροτικών περιοχών, αλλά και μικρότερων δήμων (όπως Φαρκαδόνας, Πύλης και Καλαμπάκας). Το χάσμα ψηφιακών υποδομών των δήμων αλλά και ψηφιακών δεξιοτήτων που υπάρχει στους πληθυσμούς των αστικών και αγροτικών περιοχών, καθιστά την εφαρμογή νέων ψηφιακών λύσεων μια πραγματική πρόκληση.

Οι μελλοντικές συνθήκες που απεικονίζονται στα δύο σενάρια υποδεικνύουν ότι ο στρατηγικός σχεδιασμός ψηφιακής μετάβασης των Τρικάλων οφείλει να διευρύνει το πεδίο στόχευσής του πέρα από τις προσπάθειες που αποβλέπουν αποκλειστικά στην υιοθέτηση εργαλείων και ψηφιακών υποδομών. Τόσο στο θετικό όσο και στο αρνητικό μελλοντικό σενάριο αναδεικνύεται η σημασία όλων στοιχείων του ευρύτερου συστήματος (κοινωνικών-τεχνολογικών-φυσικών). Έτσι, η διεύρυνση της αξιοποίησης τεχνολογικών λύσεων, ειδικά όταν αυτή τοποθετείται σε ένα πλαίσιο κοινής στρατηγικής κατεύθυνσης των δημόσιων φορέων, είναι βασικός παράγοντας για την πετυχημένη καθιέρωση βιώσιμων πρακτικών στην διαχείριση του νερού. Το ίδιο σημαντικές είναι όμως την ίδια στιγμή και δράσεις για την ανάπτυξη των ψηφιακών δεξιοτήτων των τοπικών κοινωνιών που θα επιτρέψουν προσαρμοσμένες ψηφιακές παρεμβάσεις και χρήση νέων υπηρεσιών. Με τον τρόπο αυτό επιτυγχάνεται η 'από κάτω προς τα πάνω' βιώσιμη διαχείριση του νερού σε τοπικό επίπεδο, μέσα από την δημιουργία μιας διευρυμένης ομάδας τελικών χρηστών, ευαισθητοποιημένων σε ζητήματα περιβαλλοντικά και ενημερωμένων ως προς τα οφέλη των ψηφιακών παρεμβάσεων.

ΣΤΟΧΟΙ ΜΕΛΛΟΝΤΙΚΗΣ ΠΟΛΙΤΙΚΗΣ

Πρωώθηση του ψηφιακού αλφαριθμητισμού και της ανάπτυξης ψηφιακών δεξιοτήτων

- Ανάπτυξη οριζόντιων δράσεων που εστιάζουν στην άμβλυνση του χαμηλού επιπέδου ψηφιακού αλφαριθμητισμού στις αγροτικές περιοχές των Τρικάλων.
- Πρωώθηση μια ευρείας εφαρμογής δημοσίων προγραμμάτων 'δία βίου μάθησης', επαγγελματικών προγραμμάτων κατάρτισης, καθώς και προγραμμάτων πρωτοβάθμιας, δευτεροβάθμιας και τριτοβάθμιας εκπαίδευσης αποσκοπώντας στην δημιουργία νέων προτύπων στην βιώσιμη διαχείριση του νερού.

Καθοδήγηση της 'Εξυπνης' μετάβασης των Τρικάλων προς την βιώσιμη διαχείριση του νερού

- Ανάπτυξη στοχευμένων δράσεων προώθησης της καινοτομίας στην περιοχή με γνώμονα την σύγκλιση με τους άξονες στρατηγικού περιφερειακού σχεδιασμού και σχεδιασμού ψηφιακής μετάβασης των Τρικάλων.
- Σχεδιασμός δράσεων που θα συμβάλλουν στην διευκόλυνση υλοποίησης υφιστάμενων πολιτικών, όπως η εφαρμογή Σχεδίων Διαχείρισης σε επίπεδο λεκάνης Απορροής Ποταμού, η αδειοδότηση για την χρήση του νερού (ΚΑΠ 2014-2020), η επιβολή περιβαλλοντικού φόρου για την κατάσταση των υδάτων (ΕΣΠΑ 2014-2020), καθώς και η περεταίρω υιοθέτηση ψηφιακών μηχανισμών ελέγχου και παρακολούθησης.

Πρωώθηση της Κυκλικής Οικονομίας

- Σχεδιασμός μελλοντικών δράσεων για την διαχείριση αποβλήτων που θα ενισχύσουν την μετάβαση προς την κυκλική οικονομία και ευθυγράμμιση των περιφερειακών δράσεων με τα νέα Ευρωπαϊκά και Εθνικά πλαίσια σχετικά με το ποσοστό επαναχρησιμοποίησης και ανακύκλωσης των αστικών στερεών έως το 2030.
- Παροχή κινήτρων με τη μορφή χρηματοδοτικών μηχανισμών και προγραμμάτων κατάρτισης για την προσέλκυση επενδύσεων και την αναβάθμιση των τοπικών Μικρών και Μεσαίων Επιχειρήσεων με τρόπο που θα επιταχύνει την πράσινη και ψηφιακή μετάβαση της περιοχής.



This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalization in the context of Sustainable Water Management Practices in Trikala, Central Greece.

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Oživljavanje ruralnih područja 2030

DigiFarmTour Living Lab

Cilj Hrvatskog Living Lab-a koji se nalazi u regiji jadranske Hrvatske je istražiti moguće veze između malih održivih poljoprivrednika, turista i potrošača. Prvi cilj je pronaći odgovarajući način za stvaranje političkih i infrastrukturnih sredstava za održivi ruralni život. Uz trenutne trendove, veliki broj sela i farmi biti će „napušteni“ do 2030. godine, što zahtjeva razna rješenja.

Napredak poljoprivrede i cjelokupna digitalizacija države i društva omogućit će potrebnu infrastrukturu za razvoj trgovine i izravne prodaje poljoprivrednih proizvoda. Glavni identificirani izazovi u procesu oživljavanja ruralnih područja su društveno-tehnoloških karakteristika. Omogućavanje pristojnog života u ruralnim područjima s „civilizacijskom infrastrukturom“, odgovarajućom zdravstvenom skrbi za sve dobne skupine, obrazovanjem, državnim ustanovama i e-vladom ključni su čimbenici.

KONTEKST

Trenutno stanje digitalizacije u Hrvatskoj je osrednje. Što se tiče digitalnih vještina, mlađa generacija u Hrvatskoj (16-34 godine) su bolje od prosjeka EU-27. Udio poljoprivrednika u mlađim dobnim skupinama (do 40 godina) u Hrvatskoj je relativno nizak (oko 12% poljoprivrednika), pa se može pretpostaviti da je ukupan broj ljudi s dobrim digitalnim vještinama nizak. Ostale dobne skupine koje imaju učinak ispod prosjeka EU-27 u pogledu digitalnih vještina predstavljaju najveći dio sektora i gospodarstva općenito.

Iako Hrvatska ima dobru pokrivenost brzom širokopojasnom mrežom (86% na nacionalnoj razini i 39% u ruralnim područjima), ukupno korištenje fiksnog širokopojasnog pristupa je ispod prosjeka EU-a. Jedan od pozitivnih pomaka u povezivanju je dodjela usklađenog spektra za 5G u kolovozu 2021.

Digitalizacija usluga i dostupnost moderne širokopojasne infrastrukture zadovoljavajuća je u urbanim sredinama, a na tržištu postoji nekoliko pružatelja usluga. Cijene usluga su više od prosjeka EU, a u nekim slučajevima i znatno skuplje u odnosu na relative troškove života.

Stručnjaci iz zainteresiranih sektora, u ovom slučaju poljoprivrede, turizma i

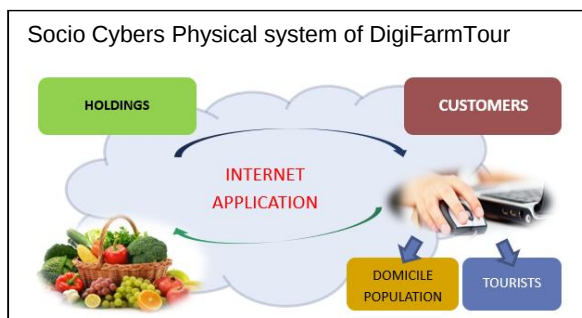
Informacijsko-komunikacijskih tehnologija udružili su se u DigiFarmTour Living Lab (LL). Dokazano je da korištenje digitalnih tehnologija u obliku interaktivnih web aplikacija/stranica otvara nove mogućnosti poljoprivrednicima za promicanje i izravnu prodaju vlastitih poljoprivrednih proizvoda. Kontekst povezivanja poljoprivrednog i turističkog sektora glavna je tema Hrvatskog LL-a. Ključni problemi koje je LL identificirao su nedostatak znanja o korištenju digitalnih tehnologija, kao i neravnomjerna pokrivenost internetom u ruralnim područjima. Iako su nacionalne strategije i politike digitalizacije koje su stupile na snagu nakon 2013. godine identificirale ovaj problem i planirale odgovarajuće intervencije, njihova provedba nije bila potpuno uspješna. Nedostatak ljudskih resursa i vještina potrebnih za korištenje javnih sredstava kroz otvorene pozive za infrastrukturna ulaganja rezultirao je sporim širenjem širokopojasne pokrivenosti, posebice ultrabrzog interneta. Kreiran je pravni okvir za kontinuirani napredak u cjelokupnom kontekstu digitalizacije te se očekuje povećanje ukupne digitalizacije hrvatskog društva te poboljšanje razvoja digitalne infrastrukture i vještina.

ISTRAŽIVAČKI PRISTUP

Hrvatski LL fokusira se na ulogu digitalizacije u olakšavanju prodaje domaćih proizvoda turističkom sektoru korištenjem napretka u digitalizaciji društva.



**DIGITALNE TEHNOLOGIJE
POKRETAČ SU PROMJENA ZA
SVE SEKTORE A POSEBNO ZA
IZRAVNU PRODAJU
POLJOPRIVREDNIH PROIZVODA.**



Glavno pitanje bilo je **"Kako će digitalne tehnologije poboljšati promociju i prodaju domaćih poljoprivrednih proizvoda na turističkom tržištu do 2031.?"**. Rasprava tijekom radionica obuhvatila je sve čimbenike koji utječu na LL: Očekivana buduća poljoprivredna proizvodnja (proizvodnja maslina i ulja), budućnost trgovine (evolucija internetskih trgovina), turizma, kao i društvenih aspekata života.

Poljoprivrednu proizvodnju u regiji karakteriziraju pašnjaci i livade (57%), oranice (21%), nasadi maslina (10%) i vinogradi (5,5%). Prosječna veličina gospodarstva u jadranskoj regiji je mala (1,1 ha). Turizam je s udjelom od oko 20% u BDP-u (nacionalno bogatstvo) najvažnija gospodarska djelatnost u ovoj regiji. Dakle, cjelovit pristup razvoju ove regije nije moguć bez povezivanja poljoprivrede i turizma.

Svjetsko tržište je zasićeno jeftinim poljoprivrednim proizvodima masovne proizvodnje, često nedovoljno poznatim načinom uzgoja. Domaće proizvedena i autentična autohtona hrana postaje važan čimbenik turističke atraktivnosti mjesta. Jedno od rješenja u takvoj situaciji je

izravna prodaja vlastitih poljoprivrednih proizvoda. Korištenje digitalnih tehnologija u obliku specijalizirane, interaktivne web aplikacije otvara nove mogućnosti poljoprivrednicima za promicanje i izravnu prodaju vlastitih poljoprivrednih proizvoda. Mala gospodarstva tako dobivaju kvalitetni marketinški alat za izravnu komunikaciju s krajnjim kupcima.

RAZVOJ SCENARIJA

Kroz interaktivne radionice LL-a razvijena su dva glavna scenarija koja predviđaju situaciju u 2030. godini: "Digitalno obojeni ruralni život (DCRL)" i "Elitni, lokalni, ekološki, digitalni alati (ELEDA)".

Digitalno obojeni seoski život (DCRL)

U slučaju DCRL-a, mladi par odlučuje promijeniti stil života i zamijeniti urbanu sredinu ruralnom. Dobri uvjeti i razni poticaji daju im hrabrosti da se odluče za život na selu. Ideja je živjeti od proizvoda koje proizvode na vlastitoj zemlji. Izvor prihoda kroz diversifikaciju njihove farme u uvjetima dobre ekonomske i političke situacije nudi im sigurnost i obećava visok standard.

Odmah po dolasku shvaćaju da im znanje praktično i teoretsko o životu na selu i proizvodnji hrane nije dovoljno, traže savjet i prijavljuju se u lokalnu poljoprivrednu savjetodavnu službu koja je besplatna i nudi savjete prilagođene njihovim potrebama. U sklopu savjetodavnih usluga dobivaju sve relevantne informacije od tehnologija proizvodnje i prerade vlastitih proizvoda do registracije turističko-ugostiteljske djelatnosti, tehničkih i zakonodavnih preduvjeta. U sklopu savjetodavne službe pronašli su partnere koji će im omogućiti prolazak rješenja za sve izazove s kojima se susreću te stupiti u kontakt s drugim proizvođačima sa sličnim problemima. Zahvaljujući svemu tome imaju više hrabrosti i osjećaju se kao dio zajednice i određena sigurna mreža.

2031. Hrvatska obala Jadrana slovi za jedno od najsigurnijih mjesta na Mediteranu, a uz pomoć aplikacije koja turistima nudi sve potrebne informacije,

etablirala se kao mjesto elitnog turizma. Proizvodi seoskih gospodarstava su vrlo traženi i relativno skupi te si ih zbog ograničene proizvodnje može priuštiti samo određeni broj ljudi. Proizvođači poljoprivrednih, prehrambenih proizvoda i pružatelji raznih usluga na farmama u ruralnim područjima povezani su u mrežu digitalnih usluga koja im omogućuje pristup određenim informacijama, uslugama (npr. strojevi za berbu, proizvodni roboti, distribucija teretnim dronovima i sl.) i kontaktima svih relevantnih čimbenika agro-rural-turističkog sektora.

Takve obitelji imaju sigurnost i želju odgajati svoju djecu u uređenom ruralnom području. Druga generacija tih obitelji više nema pionirskih problema kao njihovi roditelji i može se posvetiti podizanju kvalitete rada i života.

Time smo uspješno oživjeli ruralni prostor, očuvali kulturu i baštinu seoskih područja te osigurali kvalitetniji život njegovih stanovnika. Život na selu više nije stigmatiziran kao manje vrijedan i ljudi se u ruralnim područjima ne osjećaju izolirano ili necijenjeno zbog svog načina života, već svoj način života vide smislenijim i ispunjenijim nego u urbanim i prigradskim središtima.

Elitni, lokalni, ekološki, digitalni alati (ELEDA)

Primjenom novog zakona koji svim građanima EU-a omogućuje kupnju zemljišta u Republici Hrvatskoj dolaze velike tvrtke, ali i niz malih proizvođača koji traže plodno zdravo zemljište za poljoprivrednu proizvodnju. Zbog rata i drugih društveno-političkih čimbenika, velik dio hrvatskog poljoprivrednog zemljišta je neobrađen više od 30 godina, gdje je moguća proizvodnja visokokvalitetnih ekoloških proizvoda.

Tako, osim u proizvodnji hrane, novi poljoprivrednici koji se vraćaju u život u ruralnim područjima svoju priliku za zaradu vide kroz neki oblik agroturizma. Većina ljudi koji se odluče preseliti u ruralno područje i baviti se poljoprivredom nisu toliko vješti u poljoprivredi i trebaju savjete i znanje. Pitanje je koliko će moći dobiti

tražene informacije od raznih savjetnika ili konzultanata i koliko će ih to koštati

Pandemija Covida ostavila je traga na sektoru turizma. Turisti sada traže manja mjesta s autohtonim iskustvom, što u ruralna područja dovodi razne pružatelje turističkih i ugostiteljskih usluga. U nedostatku cjelovite strategije razvoja agro-ruralno-turističkog sektora, uz poljoprivrednike u ruralna područja dolaze isključivo turističke tvrtke, želeći iskoristiti trend u turizmu. Profesionalne turističke tvrtke su nelojalna konkurencija poljoprivrednicima koji također žele ugostiti turiste i ponuditi im autohtono iskustvo života u ruralnom području te ponuditi proizvode vlastitog gospodarstva i proizvodnje na licu mjesta.

Takvi isključivo turistički sustavi ne razvijaju život i ne oživljavaju ruralna područja i njihovu baštinu, već su aktivno rade tijekom turističke sezone, a ostatak godine se zatvara i ta područja su ponovno "mrtva". U osnovi, postoje svi preduvjeti za formiranje turističke mreže proizvodnje hrane i revitalizaciju ruralnih područja, ali svi ti pojedinačni dijelovi nisu smisleno povezani zajedničkom strategijom.

Lokalno gospodarstvo nema puno koristi od takvog turizma što smo mogli vidjeti na primjeru turizma u tropskim mjestima kada su zbog Covida ova područja propustila dvije turističke sezone, jučerašnja živahna turistička mjesta srušila su se kao kule od karata, ostavljajući ljude u teškom siromaštvu.

Opasnost u nedostatku sveobuhvatne strategije ruralnog razvoja je da ova ruralna područja ne postoje bez turizma.

Dolaskom stranih i domaćih tvrtki ali i pojedinaca u dosad napuštena ruralna područja oživljavaju sela i život u njima. Ljudi različitog porijekla pokušavaju stvoriti zajednice u kojima će tvoriti seoski idiličan život.

Zbog zdravstveno-socijalno-političke nesigurnosti ne mogu postići željeni standard i osjećaju se zakinto u odnosu na ljude u urbanim sredinama. Druga generacija razmišlja o odlasku iz ruralne sredine i ne osjeća se ponosno ili posebno jer se bavi poljoprivredom i živi seoskim životom.

Tijekom radionica identificirano je nekoliko ključnih izazova koji se mogu podijeliti u kategorije poljoprivrede, trgovine i društvenih izazova. S napretkom u poljoprivredi i povećanjem digitalizacije i automatizacije očekuje se da će 2031. malo obiteljsko poljoprivredno gospodarstvo moći biti održivo i pristojno živjeti. Rizik tržišnih fluktuacija koje imaju razorne učinke na proizvođače će biti manji. Zbog relativno niskih primanja ljudi koji žive u Hrvatskoj, ciljano tržište za takve proizvode su turisti (bilo kroz pojedinačne turističke rute ili kroz ugostiteljstvo i hotele). Prije krize izazvane pandemijom bolesti COVID-19 Republiku Hrvatsku je godišnje posjećivalo gotovo 19 milijuna turista, uglavnom u regiji LL. Ukupno gledano, digitalizacija će omogućiti transformaciju prodaje poljoprivrednih proizvoda i vjerojatno dovoljno jeftine mogućnosti isporuke. Osim toga, povećava se motivacija mlade generacije za život u ruralnim područjima.

Razlike u uspješnom prevladavanju ovih izazova nude moguće scenarije. Ako vlast i društvo uspiju pronaći prave politike koje će omogućiti napredak i stvoriti pozitivnu klimu, situacija će biti poput 'Digitalno obojeni seoski život (DCRL)'. Ako ne, depresija i daljnje propadanje sela i ruralnih područja bit će neizbježni.

DISKUSIJA O POLITIKAMA

Hrvatsko gospodarstvo vrlo je ovisno o turizmu koji čini oko 20% BDP-a. Glavno zanimanje i izvor prihoda u ruralnim područjima je poljoprivreda. Trenutno aktivne državne strategije u području poljoprivrede usmjerene su na prelazak poljoprivrede na isplativu i tehnološki naprednu poljoprivrednu proizvodnju (proizvodnja povrća, voća, maslina, grožđa/vina), diverzifikaciju obiteljskih poljoprivrednih gospodarstava, kao i na povećanje stupnja obrade proizvoda direktno na gospodarstvu. Digitalizacija vlade i gospodarstva također se povećava, a dodatno ju je ubrzao COVID-19 i pandemijske mjere. Zakonodavstvo u vezi s on-line kupnjom također se prilagođava što je brže moguće. Ključni čimbenici u ruralnim područjima bit će provedba

socijalne i demografske politike s ciljem poticanja mladih ljudi (obitelji) na povratak u ruralna područja i pokretanje poslovanja/modernih poljoprivrednih gospodarstava.

Nedostatak jasne politike i ekonomske strategije ruralnog razvoja ne nudi im dovoljnu financijsku ili savjetodavnu pomoć u rješavanju problema održivosti gospodarstava.

Klimatske promjene uzrokovale su pojavu nepovoljnih vremenske prilike vrlo čestim, a poljoprivredna proizvodnja je donekle nestabilna i nepouzdana. Da bi bio uspješan proizvođač, poljoprivrednik mora koristiti sve dostupne tehnologije (navodnjavanje, mreže za zaštitu od mraza, lovce na mraz, itd.), ali su vrlo skupe i većini proizvođača nedostupne. Tržište je vrlo zahtjevno i potrošači zahtijevaju samo 'savršene proizvode' i dostupnost proizvoda tijekom cijele godine. Prihodi poljoprivrednika su niski jer su strojevi i proizvodni troškovi vrlo skupi, a podjela između bogatih i uspješnih i siromašnih, urbanih i ruralnih je značajna.

Glavni izazov je kako osigurati sva potrebna civilizacijska dostignuća koja se očekuju u 21. stoljeću (dostupno zdravstvo, obrazovanje djece, kulturni sadržaji, cestovna infrastruktura, digitalizacija) u ruralnim područjima koja su udaljena od gradova

Zajednički pristup poljoprivrednih, trgovačkih i socijalnih (zdravstvenih, obrazovnih, kulturnih i dr.) politika, kako bi se omogućio život potomaka poljoprivrednih proizvođača u ruralnim područjima, ključan je za opstanak hrvatskih ruralnih područja. Osjećaj zadovoljstva nije u novcu, već je povezan s kvalitetom života.



This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

Hrvatski plan oporavka i otpornosti

Hrvatski plan, koji podrazumijeva ukupnu investiciju od cca. 6,3 milijarde eura, uključuje digitalna ulaganja od ukupno 1.285 milijardi eura (20,4% proračuna plana). Strukturiran je oko pet prioriteta: (i) gospodarstvo; (ii) javna uprava, pravosuđe i država; (iii) obrazovanje, znanost i istraživanje; (iv) tržište rada i socijalna sigurnost; i (v) zdravstvena skrb.

- Ulaganja u digitalnu tranziciju u ukupnom iznosu od 576 milijuna eura.
- Ulaganja javne uprave od 437 milijuna eura.
- Ulaganje u komponentu obrazovanja, znanosti i istraživanja od 158 milijuna eura.
- Ulaganje u tržište rada i socijalnu komponentu od 57 milijuna eura.

Svi ti prioriteti jesu i moraju biti jednako zastupljeni jer djeluju kao lanac. Stoga bi sva zakonodavstva u različitim sektorima trebala biti sinkronizirana.

Zakonodavstvo o ekološkoj proizvodnji

- Slijedom Nacionalnog plana ruralnog razvoja 2023. – 2027. usvajanjem nacionalne strategije i akcijskog plana za ekološku poljoprivredu i proizvodnju ekoloških poljoprivrednih i prehrambenih proizvoda

Informatička infrastruktura

- Razvoj e-javne uprave prema europskim smjernicama te razvoj e-usluga, e-usluga za građane i e-usluga za poslovne subjekte.

Nacionalna digitalna agenda

- Nakon Nacionalnog plana za razvoj širokopojsnog pristupa 2021. – 2027. i implementacije 5G usvajanjem okvira politike za uključivanje autonomnih i pametnih strojeva u ciklus agroproizvodnje.

Transformacija savjetodavne službe i integracija sa socioekonomskim temama

- Kvalitetno obrazovanje dostupno svima pod jednakim uvjetima s obzirom na načela cjeloživotnog učenja.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalization in the context of DigiFarmTour in the Adriatic region of Croatia.

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Digitalizzazione e tracciabilità della filiera legno-energia in Italia

Questo brief presenta il lavoro del Living Lab (LL) organizzato per rispondere alla domanda "Come la digitalizzazione trasformerà la tracciabilità nella filiera foresta-legno-energia in Italia entro il 2031?"

Il LL ha quindi individuato due principali narrative di scenario basate su due cosiddetti "scenari intermedi": uno scenario "buono ma non migliore" denominato **"Filiera foresta-legno-energia digitalizzate e trasparenti: un percorso verso una bioeconomia forestale sostenibile"** e uno scenario "negativo ma non peggiore" denominato **"Digitalizzazione per la tracciabilità nel settore foresta-legno-energia: un'opportunità rimandata"**.

Sono state suggerite quattro specifiche scelte politiche, descritte in questo documento: promuovere e finanziare iniziative di collaborazione e cooperazione tra proprietari di boschi e aziende forestali; sostenere la domanda e il consumo di legno nazionale; favorire l'innovazione digitale per le aree montane; aumentare l'attrattività delle aree montane e forestali.

CONTESTO

Il taglio illegale delle foreste, danneggia significativamente sia il mercato legale che l'erario, favorendo l'evasione fiscale e creando opportunità di riciclaggio di denaro. Ogni anno in Italia (che è il primo importatore mondiale di legna da ardere) è stimato che vengano importate tonnellate di legname senza una chiara tracciabilità. Per favorire la produzione di legname da fonti legali, l'UE ha emanato la "Timber Regulation" (EUTR - Reg. n. 995/2010). In particolare, l'EUTR ha l'obiettivo di minimizzare il rischio di immissione sul mercato europeo di legname illegale. L'EUTR, infatti, impone agli operatori europei di esercitare la cosiddetta "dovuta diligenza", basata sulla fornitura di informazioni specifiche e affidabili sulla fornitura di legname. Il meccanismo disegnato dall'EUTR e dalla "dovuta diligenza" richiesta, si basa in larga parte sul flusso di informazioni e dati che permette sia la valutazione del rischio che l'introduzione di misure di mitigazione dello stesso. Ad oggi, questa procedura è spesso basata su scambio di documenti cartacei, in quanto la verifica della tracciabilità si basa fortemente (se non esclusivamente) su documenti (controllo documentale); mentre

l'applicazione di soluzioni digitali nel settore è generalmente poco diffusa. In questo contesto, le principali esigenze identificate dal nostro Living Lab (LL) possono essere riassunte come segue:

1. Aumentare la trasparenza nel settore forestale;
2. Stimolare la domanda di prodotti forestali legali e sostenibili;
3. Migliorare l'accesso a tecnologie accessibili sia da un punto di vista tecnico che economico per la tracciabilità del legname;
4. Promuovere la pianificazione forestale partecipativa e l'organizzazione della catena di approvvigionamento;
5. Promuovere l'istruzione digitale e la formazione permanente.



APPROCCIO DI RICERCA

L'obiettivo dell'attività è stato quello di esplorare le possibili evoluzioni, da oggi a 10 anni, del settore foresta-legno-energia, con particolare attenzione alla trasformazione digitale, fornendo idee e stimoli per gli stakeholder e i policy-maker. Per raggiungere questi obiettivi, i partecipanti al LL, si sono trovati in due workshop che si sono tenuti a settembre e ottobre 2021. Durante gli incontri sono state svolte le seguenti attività: i) definizione della domanda di scenario; ii) elaborazione di narrazioni di scenario; iii) definizione dei driver del cambiamento; e iv) identificazione di percorsi futuri plausibili.



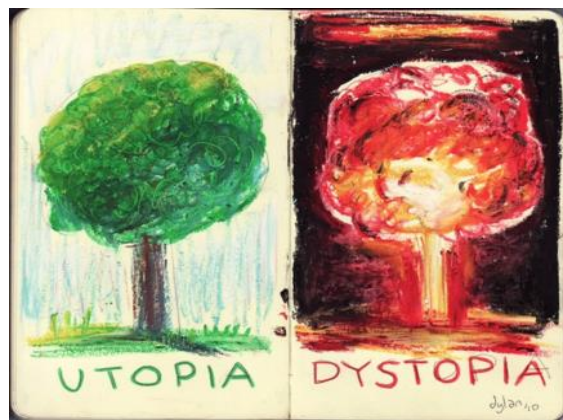
IL LIVING LAB HA SVILUPPATO SCENARI INTERROGANDOSI SU COME LA DIGITALIZZAZIONE TRASFORMERÀ LA TRACCIABILITÀ NEL SETTORE FORESTA-LEGNO-ENERGIA NEI PROSSIMI 10 ANNI.

In primo luogo, i partecipanti ai LL hanno definito la "scenario question" alla base delle attività del LL: **in che modo la digitalizzazione trasformerà la tracciabilità nel settore foresta-legno-energia in Italia entro il 2031?** Sulla base di questa domanda, è stata svolta un'attività aperta e partecipativa per la definizione di scenari plausibili che potrebbero verificarsi da qui al 2031. Sono stati infatti identificati due scenari intermedi caratterizzati da evoluzioni diverse e plausibili dei driver socio-economici, ambientali, politici e tecnologici. Successivamente, sono stati individuati anche due scenari estremi (che evocano situazioni "utopiche" e "distopiche").

GLI SCENARI SVILUPPATI

Ai partecipanti di LL è stato chiesto di elaborare narrazioni di scenario basate su due scenari intermedi, uno scenario "buono ma non migliore" (BnB) (denominato **"Filiera foresta-legno-energia digitalizzate e trasparenti: un percorso verso una bioeconomia forestale sostenibile"**) e uno scenario "negativo ma non peggiore" (WnW) (denominato

"Digitalizzazione per la tracciabilità nel settore foresta – legno – energia: un'opportunità rimandata").



Nello scenario BnB, i vincitori saranno certamente le aziende in grado di gestire fonti di energia pulita (come le foreste) nelle aree montane. Anche le giovani generazioni agiranno come promotori di una trasformazione verso una bioeconomia forestale sostenibile. Nello scenario BnB, l'uso delle risorse forestali tracciate per scopi energetici genererà un maggiore **valore aggiunto per la filiera energetica locale** e contribuirà positivamente a una migliore immagine delle aree interne e a promuovere il turismo. Inoltre, la transizione digitale contribuirà ad **aumentare l'attrattiva delle aree rurali per i lavoratori e le famiglie provenienti dalle aree urbane**. Nello scenario WnW, invece, i vincitori saranno le aziende che operano illegalmente e le grandi organizzazioni in grado di inglobare le piccole ditte operanti nel settore forestale. In questo scenario un'incertezza chiave riguarderà le **pressioni e le richieste provenienti dalla società civile** (principalmente persone che vivono nelle aree urbane, non sempre con una conoscenza tecnica adeguata e libere da pregiudizi sul legno-energia) che potrebbero finire per sostenere indirettamente l'uso di combustibili fossili e il nucleare, scoraggiando la produzione di biomassa a fini energetici. Inoltre, in questo scenario **non esiste una filiera strutturata**. Ciò è dovuto ad una deindustrializzazione del settore che porta ad una minore disponibilità di residui che vengono

valorizzati nella filiera energetica. A questo proposito, un'incertezza fondamentale riguarda la reale capacità delle imprese forestali di riorganizzarsi e di coordinare meglio le loro attività e decisioni mettendosi in rete e cooperando.

DISCUSSIONE POLITICA

Durante le attività del LL, i partecipanti sono stati incoraggiati a identificare politiche e programmi sulla base delle seguenti domande: quali azioni dovrebbero essere intraprese per beneficiare di plausibili opportunità future o, in alternativa, per mitigare i rischi che il futuro può riservare?

In una fase successiva, i partecipanti del LL hanno considerato se le politiche e le idee ipotizzate come adatte per lo scenario BnB sarebbero state efficaci nello scenario WnW, e viceversa.

Come risultato di questo dibattito, abbiamo selezionato le strategie politiche che potrebbero essere potenzialmente efficaci per entrambi gli scenari.

In primo luogo, è stato dato risalto a quelle politiche in grado di promuovere e finanziare iniziative di collaborazione e cooperazione tra proprietari forestali e ditte boschive. Tali politiche, infatti, sarebbero in grado sia di aumentare le opportunità nello scenario BnB che di mitigare i rischi nello scenario WnW.

Infatti, i partecipanti al LL hanno proposto di sostenere la creazione di reti commerciali, piattaforme logistiche e piattaforme per lo scambio di legno. Sia negli scenari positivi che in quelli negativi, questo tipo di politica potrebbe contribuire a rafforzare il coordinamento tra gli attori lungo la catena di approvvigionamento dei prodotti forestali.

Altre politiche chiave individuate sono legate alla capacità di **sostenere la richiesta e il consumo di legno locale.** A questo proposito, l'abbassamento dell'IVA su tutti i prodotti forestali può contribuire ad aumentare le possibilità di business e le opportunità di lavoro nelle zone di montagna. Inoltre, sostenere la creazione di un marchio "legno italiano" per meglio comunicare e promuovere il ruolo del legno locale e certificato e creare un sistema di

Green procurement può essere una buona strategia per entrambi gli scenari.

Inoltre, aumentare l'**attrattività delle aree montane e forestali** è vista come una politica in grado sia di aumentare gli aspetti positivi in uno scenario BnB sia di mitigare gli aspetti negativi in uno scenario WnW. In generale, tale politica è vista come un'opportunità per attrarre persone (giovani in particolare) nelle aree interne e marginali.

A questo proposito, una delle principali sfide in entrambi gli scenari è, infatti, quella di fermare la "fuga di cervelli" dalle aree interne e montane verso le aree urbane, offrendo opportunità di lavoro e formazione e a coloro che decidono di vivere nelle aree interne.



LE AZIONI DI CO-PROGETTAZIONE PER MIGLIORARE LE COMPETENZE DIGITALI NEL SETTORE FORESTALE ITALIANO È UNA DELLE PRIORITÀ POLITICHE INDIVIDUATE.

Infine, ma non meno importante, aumentare il **grado di innovazione e maggiore di competenze digitali nelle aree montane**, può contribuire positivamente allo sviluppo di entrambi gli scenari. A questo proposito, va riconosciuto il ruolo cruciale delle competenze digitali e la necessità di co-progettare con gli stakeholder locali i relativi servizi e le azioni.

In uno scenario BnB, l'educazione digitale e la formazione a lungo termine degli operatori rappresentano una pietra miliare fondamentale anche al fine di proteggere la privacy degli utenti. Infatti, non c'è possibilità di sicurezza digitale senza alfabetizzazione digitale, dato che "la persona è il primo mezzo per proteggere la privacy".

Infine, in uno scenario WnW, l'introduzione di innovazioni già consolidate e ampiamente utilizzate in altri contesti potrebbe portare alcuni vantaggi. A questo proposito, è strategico valorizzare la capacità di trasferire quelle tecnologie e soluzioni già disponibili e consolidate in altri settori e adattare al settore forestale.



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OPZIONI POLITICHE

Promuovere e finanziare iniziative di collaborazione e cooperazione tra proprietari e imprese forestali

- Sostenere la creazione di reti di imprese e piattaforme logistiche al fine di contribuire a colmare il vuoto di coordinamento tra gli attori lungo la catena di approvvigionamento dei prodotti forestali, favorendo l'uso del legno a cascata e la tracciabilità.

Sostenere la domanda e il consumo di legno locale

- Diminuire l'IVA su tutti i prodotti forestali, premiando la loro caratteristica intrinseca di immagazzinare "CO₂" e quindi di avere un impatto positivo, a determinate condizioni, sulla crisi climatica. Inoltre, va riconosciuto che lo stoccaggio di CO₂ in questi prodotti è vantaggioso anche per i territori da cui il legno è stato prelevato e utilizzato.
- Sostenere la creazione di un marchio "legno italiano" per meglio comunicare e promuovere il ruolo del legno locale e certificato.
- Sostenere l'applicazione di sistemi digitali per la tracciabilità del legno per energia.
- Creare un sistema di Green procurement per incentivare la produzione locale di legno.

Aumentare l'attrattiva delle aree montane e forestali

- Investire sul welfare pubblico, agendo su scuola, trasporti, welfare e servizi nelle aree interne e montane.
- Sostenere l'avvio e la crescita di "cooperative di comunità", come le "comunità energetiche".
- Introdurre mutui agevolati e sgravi fiscali per gli abitanti delle aree interne e montane.

Aumentare l'innovazione e le competenze digitali nelle zone di montagna

- Migliorare le abilità e le competenze digitali degli attori locali e la co-progettazione di nuovi servizi e azioni.
- Facilitare l'accesso a intermediari e broker della digitalizzazione, aumentando le opportunità per sostenere la digitalizzazione.

Questo rapporto informativo è pubblicato nell'ambito del progetto DESIRA, finanziato dall'UE, e mira a fornire raccomandazioni ai responsabili politici su come supportare la digitalizzazione nel contesto della tracciabilità del legname destinato alla produzione di energia in Italia.

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Digitalizzazione della gestione ordinaria del territorio nelle aree rurali con paesaggio montano

Questo breve documento presenta la discussione del "Living Lab" Toscana Nord sull'uso della digitalizzazione per la prevenzione del rischio idrogeologico. L'idea principale è che la digitalizzazione possa facilitare il flusso di informazioni dal campo al decisore politico, coinvolgendo diversi attori con l'obiettivo di identificare la necessità di interventi di manutenzione.

In questo contesto, il Living Lab ha descritto due scenari alternativi basati su un diverso livello di interazione tra persone e tecnologia. Durante il workshop i partecipanti hanno identificato lo scenario con la più alta partecipazione della comunità locale come il preferito nel contesto del Consorzio Toscana Nord.

Dalla discussione sui due scenari fatta con gli attori locali, sono emerse quattro azioni politiche necessarie: (1) la promozione del coinvolgimento delle comunità locali nel fornire servizi pubblici in aree rurali con paesaggio montano; (2) la necessità di contribuire al reddito degli agricoltori di montagna; (3) la necessità di coinvolgere le comunità locali nel processo di progettazione delle nuove tecnologie; (4) la necessità di migliorare il funzionamento della connessione e la copertura della banda larga e le competenze digitali della pubblica amministrazione e delle comunità locali.

CONTESTO

Il rischio idrogeologico sta aumentando a causa dei climatici e dell'abbandono del territorio. I fenomeni di erosione dovuti agli eventi climatici estremi possono generare frane e alluvioni. La gestione ordinaria del territorio, basata sui costanti lavori di manutenzione sulla rete idrica, rappresenta una soluzione efficiente per ridurre il rischio. La gestione del reticolo idrografico principale è sotto la responsabilità di enti pubblici.

La gestione ordinaria del territorio include l'attività di monitoraggio costante del territorio e dei corsi d'acqua, di identificazione dei siti in cui è necessario effettuare interventi di manutenzione e l'organizzazione di tali interventi.

Ma la divisione dei ruoli tra istituzioni non è sempre chiara, specialmente nelle aree rurali con paesaggio montano dove ci sono molte questioni relative alle competenze e alla accessibilità dei corsi d'acqua.

Nell'area identificata per questo Living Lab, nel Nord della Toscana, le competenze per la gestione ordinaria del territorio sono del Consorzio di Bonifica Toscana Nord, come definito dalla legge regionale 79/2012.

L'area gestita dal Consorzio Toscana Nord ha una estensione di più di 360.000 ha che includono aree montane e di pianura. Un

monitoraggio costante della rete idrica nelle aree rurali con paesaggio montano è difficile, a causa dell'isolamento e della complessità dell'ambiente.



Figura 1. Esempio di semplici lavori di manutenzione (Pulizia di un fosso).

Il Consorzio Toscana Nord riconosce l'esperienza degli agricoltori locali e il loro ruolo nella gestione ordinaria del territorio. Considera importante il ruolo attivo degli agricoltori nel sistema di segnalazione e nella realizzazione di lavori di manutenzione di piccola scala poiché vivono sul territorio ed hanno una prospettiva di osservazione costante e qualificata, non basata su singoli sopralluoghi periodici.

Le principali attività richieste da questo contesto sono:

- Lo sviluppo di soluzioni migliori per facilitare il coordinamento del monitoraggio del territorio e dei lavori di mantenimento che contribuiscono a prevenire il rischio idrogeologico.
- L'identificazione delle necessità degli attori locali per sviluppare strumenti digitali per il monitoraggio ambientale.

APPROCCIO DI RICERCA

Il lavoro di ricerca è partito nel primo anno del progetto DESIRA dall'identificazione dell'uso delle tecnologie digitali e delle necessità della comunità locale. Questo lavoro ha costituito il punto di partenza per esplorare i possibili futuri processi di digitalizzazione della gestione ordinaria del territorio in due workshop che hanno coinvolto i partecipanti del Living Lab.

Il Living Lab Toscana Nord ha definito la seguente domanda di scenario: **"Come funzionerà la gestione ordinaria del territorio nelle aree rurali con paesaggio montano del Consorzio Toscana Nord del 2031? Che ruolo avranno le tecnologie digitali?"**

Un primo incontro online è stato svolto a Settembre 2021 con gli informatori principali del Living Lab per sviluppare una prima bozza dei possibili scenari futuri, in base alla individuazione di specifici fattori del cambiamento. Alla fine di Ottobre 2021, un workshop in presenza è stato organizzato coinvolgendo gli attori locali (es. agricoltori locali, comuni, personale tecnico del Consorzio Toscana Nord, etc.), per discutere insieme i due scenari e definirne i dettagli.



IL LIVING LAB HA SVILUPPATO POSSIBILI SCENARI FUTURI, CONSIDERANDO DIVERSI LIVELLI DI INTERAZIONE TRA PERSONE E TECNOLOGIE.

I quattro scenari possibili sviluppati nel primo workshop online con gli informatori chiave del Living Lab, sono stati presentati agli attori locali all'inizio del secondo workshop. I partecipanti al Living Lab hanno identificato come scenario preferito quello con la più alta interazione tra persone e tecnologie, in opposizione con lo scenario che considera la mancanza totale di investimenti nella digitalizzazione della gestione ordinaria del territorio (definito business as usual). Infine, le due opzioni discusse durante il workshop sono state quella "ad alta componente tecnologica (Technology Intensive) e quella "ad alta componente umana" (Human Intensive) come spiegato nella figura 2.

SCENARI SVILUPPATI

Ai partecipanti al LL è stato chiesto di elaborare delle narrative basate sui due scenari intermedi, che possono essere considerati scenari alternativi per rispondere alla domanda di scenario, a seconda dello specifico contesto di riferimento. Il Living Lab Toscana Nord ha identificato lo scenario ad alta componente umana come il preferito, anche se non il migliore e quello ad alta componente tecnologica il non preferito, anche se non il peggiore.

Lo scenario "ad alta componente umana" assume che ci sia una **popolazione rurale stabile nelle aree montane con competenze digitali di base** che permette loro di usare delle app sullo Smartphone privato. La popolazione locale, ed in particolare gli agricoltori e le imprese forestali, hanno una alta sensibilità ambientale e sono motivati a **lavorare nel loro territorio e preservarlo**.

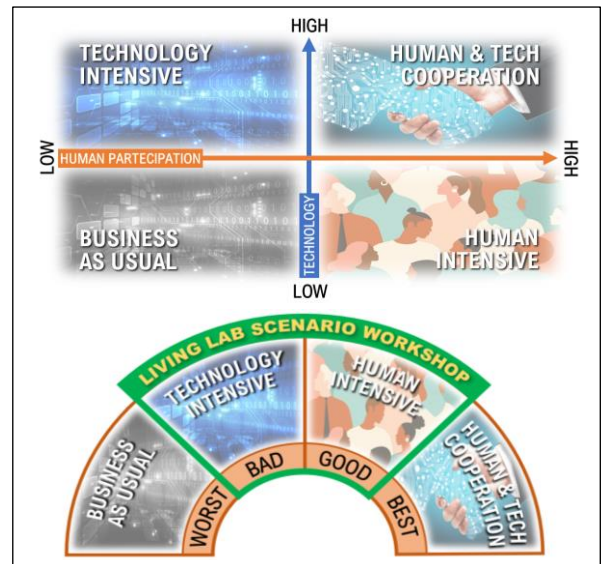


Figure 2. I quattro scenari presentati nel workshop, la valutazione dei partecipanti e l'identificazione degli scenari da sviluppare in dettaglio.

Nello scenario ad alta componente umana, su cui il Consorzio Toscana Nord sta già lavorando, **il processo di digitalizzazione mira ad incrementare l'efficienza del sistema di segnalazioni** per identificare la necessità di lavori di manutenzione sui corsi d'acqua con l'obiettivo di facilitare il coinvolgimento della popolazione locale nella gestione ordinaria del territorio. In particolare gli agricoltori locali possono inviare segnalazioni per la necessità di intervento in un sito specifico. Se **i lavori di manutenzione** richiesti sono alla loro portata, **saranno assegnati dal consorzio direttamente ai singoli agricoltori che saranno pagati per aver fornito lo specifico servizio pubblico** (lavori di manutenzione).

Questo tipo di pagamenti rappresentano una **parte significativa del reddito dei piccoli agricoltori locali** e sono un **incentivo importante per mantenere le attività agricole** nelle aree rurali con paesaggio montano. Questo scenario si focalizza sulla possibilità di aumentare il numero di agricoltori coinvolti in questo processo di e-governance e in grado di **fornire servizi pubblici in aree isolate attraverso la digitalizzazione**. La tecnologia principale su cui lavorare è lo sviluppo di una **piattaforma digitale che faciliti la comunicazione tra attori pubblici e privati a diversi livelli**.

Nello scenario ad alta componente umana il principale vincitore è la comunità locale che viene coinvolta nella gestione ordinaria del territorio ed ottiene un sistema di prevenzione di frane e alluvioni efficiente.

Lo scenario ad alta componente tecnologica assume che la **popolazione rurale diminuisce nelle aree montane** e che le poche persone rimaste **non hanno competenze digitali di base** e non sono interessate a partecipare ad iniziative di e-governance, né a collaborare con le amministrazioni locali. Si assume però che ci sia una **buona connessione e copertura di banda larga**, insieme a un **basso costo della tecnologia** che permette alle imprese IT di fornire sensori e altre tecnologie digitali alle amministrazioni pubbliche locali. Le amministrazioni pubbliche possono stabilire **un sistema automatico di monitoraggio del territorio** che gli permetta di identificare i siti in cui è necessario fare lavori di manutenzione della rete idrica.

L'aumentare di eventi climatici estremi richiede un monitoraggio costante e sempre più preciso del territorio che può essere ottenuto con un gran numero di **sensori che raccolgono dati in-situ integrati** poi con modelli previsionali di analisi dei dati climatici. Questo sistema richiede una grande **interoperabilità tra i diversi strumenti digitali e modelli utilizzati**.

La combinazione sensori locali e remoti può trasmettere le informazioni di monitoraggio del territorio solo allo staff tecnico responsabile per la gestione ordinaria del territorio. **Non c'è alcun coinvolgimento diretto della popolazione.**

I principali vincitori in questo scenario sono le imprese IT che forniscono i propri sensori e tutta la strumentazione necessaria alla realizzazione del sistema di monitoraggio automatico.

DISCUSSIONE POLITICA

I due scenari principali possono essere il risultato di diversi approcci nello sviluppo di politiche di innovazione. Mentre nello scenario ad alta componente umana, la digitalizzazione è il risultato di un processo decentralizzato di apprendimento reciproco tra attori locali, ricercatori e sviluppatori di tecnologia per sviluppare soluzioni digitali adattate alle necessità della comunità locale, nello scenario ad alta componente tecnologica, le aziende IT che sviluppano strumenti digitali per il monitoraggio ambientale (come risultato di un processo lineare di Ricerca e Sviluppo) offriranno le loro tecnologie alla pubblica amministrazione pronte per essere usate. Lo scenario ad alta componente tecnologica può portare ad una centralizzazione del compito di monitoraggio, con

la conseguenza che le comunità locali possono perdere il controllo del loro territorio.

Alcune premesse sono state identificate nella discussione politica: (1) **lo sviluppo di tecnologie per la fornitura di specifici servizi pubblici deve essere finanziati con risorse pubbliche** e non possono essere il risultato di un processo di libero mercato poiché il loro sviluppo difficilmente sarà conveniente. (2) Per sviluppare un processo di digitalizzazione entro il 2031 è necessario **incrementare l'infrastruttura per la connessione e la banda larga nelle aree montane.**

Lo scenario ad alta componente umana integra le politiche digitali con le politiche di sviluppo locale, usando strumenti digitali per creare un sistema di gestione ordinaria del territorio efficiente basato sul coinvolgimento degli agricoltori locali e delle piccole aziende con un approccio di e-governance. Gli agricoltori presenti nel workshop hanno dichiarato di essere disponibili a contribuire alla fornitura di servizi pubblici nelle aree montane e che il pagamento per la fornitura di tali servizi rappresenta una porzione significativa del loro reddito. Questo scenario richiede una forte partnership tra un ampio gruppo di attori locali ed un meccanismo di gestione delle relazioni efficiente. Il risultato di questo scenario sarà un alto livello di resilienza della comunità locale.



IL SUPPORTO ALLO SVILUPPO DI AZIONI DI CO-DESIGN PER COINVOLGERE I CITTADINI NELLA FORNITURA DI SERVIZI PUBBLICI NELLE AREE MONTANE È UNA AZIENDA POLITICA SIGNIFICATIVA.

Lo scenario ad alta componente tecnologica è basato su politiche di digitalizzazione che mirano a sviluppare una forte infrastruttura che permetta di migliorare la connessione e la copertura della banda larga nelle aree montane, a far acquistare alle pubbliche amministrazioni le tecnologie disponibili sul mercato, e ad avere delle pubbliche amministrazioni in grado di gestire la complessità delle tecnologie. Questo scenario può essere utile nel caso di assenza di una comunità locale attiva e di un alto livello di abbandono del territorio. In ogni caso i partecipanti al workshop hanno espresso le loro perplessità rispetto all'efficienza di questo tipo di scenario.

Hanno affermato che un processo automatizzato può identificare i grandi interventi necessari nei corsi d'acqua principali, ma non i piccoli lavori di manutenzione nei corsi d'acqua della rete idrica secondaria nelle aree montane. Questo aumenterebbe la vulnerabilità della comunità intera.



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OPZIONI POLITICHE

Promozione e finanziamento di iniziative che coinvolgano le comunità locali nel processo di sviluppo di soluzioni digitali adattate alle necessità e competenze locali

- Supporto allo sviluppo di reti che coinvolgano le amministrazioni e gli attori locali per contribuire alla identificazione di specifiche necessità e competenze e che facilitino la partecipazione dei cittadini nella fornitura di servizi pubblici attraverso la digitalizzazione.

Supporto al reddito degli agricoltori per assicurare il loro ruolo unico nella prevenzione del rischio

- Coinvolgere gli agricoltori nella gestione ordinaria del territorio non solo per segnalare la necessità di intervento, ma anche per effettuare lavori di manutenzione di piccola scala per avere un reddito addizionale rilevante per mantenere la propria attività economica sul territorio.
- Una volta che una piattaforma digitale per gestire la rete degli agricoltori è stata realizzata, può essere utilizzata anche per richiedere la fornitura di ulteriori servizi pubblici. Ricevendo un pagamento per tali servizi gli agricoltori sono incentivati a restare nell'area con le loro attività economiche.
- Sviluppare un approccio di e-governance che preveda il coinvolgimento degli agricoltori e delle imprese locali nella fornitura di servizi pubblici, grazie agli strumenti digitali che facilitano il processo.

Promuovere l'integrazione dell'uso delle tecnologie digitali per il monitoraggio ambientale con l'osservazione costante del territorio fatta dai cittadini, ed in particolare dagli agricoltori

- Fornire risorse alle amministrazioni locali per acquistare tecnologie necessarie a sviluppare un approccio di e-governance ed un monitoraggio ambientale basato sulla combinazione di dati di osservazione della terra con dati di osservazioni puntuali in-situ.

Aumentare la qualità della connessione e la copertura della banda larga nelle aree montane

- Garantire il funzionamento dell'infrastruttura per poter facilitare l'uso di strumenti digitali.

Aumentare le competenze digitali della pubblica amministrazione e delle comunità locali

- Migliorare le competenze digitali del personale della pubblica amministrazione con specifici corsi tecnici.
- Migliorare le competenze digitali delle comunità locali per rendere i cittadini capaci di contribuire al monitoraggio ambientale del territorio e dei corsi d'acqua nelle aree montane.

Questo rapporto informativo è pubblicato nell'ambito del progetto DESIRA, finanziato dall'UE, e mira a fornire raccomandazioni ai responsabili politici su come supportare il processo di digitalizzazione nel contesto della gestione ordinaria del territorio e della prevenzione del rischio idrogeologico nelle aree rurali con paesaggio montano.

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La digitalización en la gestión de los incendios forestales

"¿Cómo puede la digitalización contribuir a reducir los daños causados por los incendios forestales y a hacer más eficaces la lucha contra los incendios y la restauración forestal de aquí a 2031?". Esta ha sido la pregunta focal del **Living Lab (LL) andaluz coordinado por la Universidad de Córdoba**. Representantes de todas las entidades involucradas han reflexionado sobre la situación actual, las deficiencias y las oportunidades futuras. Se han esbozado dos **escenarios diferentes para 2031**. Uno positivo donde la vulnerabilidad de los bosques a sufrir incendios forestales severos aumenta debido al Cambio Climático, pero se compensa gracias a la combinación de tecnologías para la gestión forestal y a una mayor concienciación sobre la importancia de los bosques. El segundo escenario prevé una falta de gestión forestal y de planificación de la interfaz urbano-forestal. Esto, unido a la ocupación descontrolada de áreas forestales y a la desaparición de actividades agroganaderas tradicionales, deriva en el deterioro de los bosques. Las **políticas futuras** deben ir dirigidas a promover ecosistemas forestales más resilientes, zonas rurales revitalizadas económica y socialmente y a favorecer la incorporación rápida de tecnologías para la gestión de incendios.

CONTEXTO

El papel de la **digitalización en la lucha contra los incendios forestales y en la gestión post-incendio** en Andalucía es especialmente relevante en un contexto de cambio climático donde los incendios son cada vez más recurrentes, imprevisibles y difíciles de controlar. Para minimizar su impacto hay que movilizar numerosos recursos y coordinar a todos los actores quienes, además, se encuentran en un sistema Socio-Cíber-Físico complejo. Entre los factores que afectan a este sistema se encuentran la **despoblación y el envejecimiento rural** que, junto al abandono de las tierras agrícolas, han provocado el aumento de la superficie forestal, mucha de la cual, no está gestionada. Además, el **75%** de la superficie forestal andaluza es de propiedad privada y su rentabilidad está limitada por el alto coste de las actuaciones de gestión forestal y la demora en la obtención de rentas. Otro factor determinante es la variación de los **límites urbano-forestales** a medida que surgen nuevos asentamientos dentro o en las proximidades de los bosques, lo que aumenta la complejidad en la planificación territorial. Por otra parte, los avances en **I+D** para la gestión de incendios evolucionan rápidamente y requieren de una

administración pública ágil, que establezca protocolos para la **gestión de los datos** y la **interoperabilidad** de los sistemas, y que se coordine con el sector privado y la ciudadanía. Así mismo, se están demandando **profesionales que aúnen conocimientos tecnológicos y forestales**, lo que requiere una adaptación de los currículos formativos.

Las **tecnologías** para la gestión de los incendios forestales han evolucionado significativamente. Hoy en día, los **drones** facilitan la vigilancia de los incendios; los **dispositivos móviles** permiten la comunicación y geolocalización inmediatas de los operativos y de la población civil, y las mejoras en los equipos informáticos permiten **procesar grandes cantidades de datos** en tiempo real. Además, las administraciones públicas competentes tienen la intención de seguir invirtiendo en I+D y tecnología.



Figura 1. Puesto de mando de INFOCA.
Fuente: INFOCA

ENFOQUE DE LA INVESTIGACIÓN

Partiendo de la pregunta *"¿cómo puede contribuir la digitalización a reducir los daños causados por los incendios forestales y a hacer más eficaces la lucha contra los incendios forestales y la restauración forestal de aquí a 2031?"*, nos imaginamos **futuros plausibles y las estrategias y políticas** que nos llevarían hasta ellos.



LA GESTIÓN DE LOS INCENDIOS FORESTALES REQUIERE UNA COLABORACIÓN ESTRECHA ENTRE TODOS LOS ACTORES. EL LIVING LAB HA BRINDADO UNA OPORTUNIDAD ÚNICA PARA EL DEBATE Y REFLEXIÓN.

Hemos seguido un **enfoque colaborativo** involucrando a todas las partes implicadas en la gestión de los incendios forestales en Andalucía (administraciones públicas, sector privado, universidad y ciudadanía). Un **primer taller** -celebrado en diciembre de 2020 en Córdoba- nos ayudó a entender la situación actual de la digitalización en los incendios forestales, así como los puntos clave para el futuro.

En diciembre de 2021 organizamos en Sevilla un **segundo taller** en el que combinamos presentaciones, ejercicios interactivos y debates en grupo. Primero, construimos un **cronograma con los hitos de la digitalización** en la gestión de los incendios forestales de la última década. Después acordamos los **agentes de cambio** que suponen incertidumbres críticas para el futuro: la ocupación y el uso de las zonas forestales; los flujos de información en tiempo real y la disponibilidad de herramientas digitales para prevenir y controlar los incendios forestales; el Cambio Climático; la valorización de los recursos forestales y de las actividades agroganaderas tradicionales; y los canales y protocolos de comunicación. Para cada agente de cambio se propusieron **varios supuestos**, de más positivos a más negativos. Después, los participantes definieron individualmente diferentes vías que podrían conducir a la **creación de futuros escenarios**.



Figura 2. Participantes durante la segunda sesión. Fuente: UCO

LOS ESCENARIOS

En grupo, esbozamos dos escenarios. Uno **positivo** planteado dentro de un contexto de cambio climático moderado en el que los bosques son más vulnerables a sufrir incendios forestales severos. En este escenario, el uso de la tecnología para la gestión forestal y de los incendios, sumada a un aumento de la concienciación sobre la importancia de los bosques, consigue revitalizar económica y socialmente las zonas rurales y reducir significativamente el impacto de los incendios forestales. Se trata de una situación en la que todos los actores se ven beneficiados. Los principales retos de este escenario son la gran dependencia tecnológica y la confianza en que la concienciación ciudadana hacia la naturaleza aumente. Este escenario presenta oportunidades para iniciar nuevos negocios agroganaderos asociados a los bosques y para la explotación de recursos forestales alternativos. El **escenario negativo** imagina un futuro en el que la falta de gestión forestal y de planificación de la interfaz urbano-forestal, unida a la ocupación descontrolada del suelo y a la desaparición de las actividades agroganaderas tradicionales vinculadas a los bosques, deriva en el deterioro de los sistemas forestales. En este escenario, hay una escasa concienciación ambiental y los avances tecnológicos no son suficientes para revertir la situación. En un contexto de fuertes cambios en el clima, el riesgo de sufrir incendios forestales severos aumenta considerablemente. La población rural es la más perjudicada en este escenario, ya que es expulsada gradualmente de las zonas forestales y privadas de compartir su legado. Algunos de los retos que presenta este escenario van ligados al uso de las tecnologías para (1) beneficiar y fijar a la

población rural y a las actividades agroganaderas que aumentan la resiliencia del paisaje; (2) mejorar las predicciones de riesgos y comportamiento de los incendios; (3) mejorar los modelos de gestión forestal; y (4) valorizar los recursos forestales y (5) aumentar la concienciación sobre la importancia de los bosques.

ESTRATEGIAS POLÍTICAS

La gestión forestal sostenible y el desarrollo rural, la planificación territorial, la incorporación de avances tecnológicos y la gestión de datos fueron los principales temas del debate político durante los talleres.

Según los participantes, las políticas de **gestión forestal sostenible** deberían ir enfocadas a (1) **valorizar** todos los **servicios** asociados a los **ecosistemas forestales**, por ejemplo, dando un valor económico al carbono secuestrado por los bosques; (2) **aprovechar** de forma **sostenible** los **recursos forestales**; (3) generar **ecosistemas forestales más resilientes**, es decir, multifuncionales y diversos; y (4) permitir **distintos usos del suelo forestal**, como la combinación con especies agroforestales o con instalaciones de energía renovable. Estas medidas podrían reducir el impacto de los incendios forestales y mejorar la rentabilidad de las propiedades forestales. El reto está en definir un mecanismo de financiación adecuado, ya que los "impuestos verdes", por ejemplo, no son generalmente bien recibidos.

Los protocolos para la recopilación, clasificación, almacenamiento e intercambio de datos son fundamentales para la **interoperabilidad** de los sistemas y para que la información existente pueda usarse con rapidez por entidades públicas y privadas. Se deben desarrollar políticas que impulsen **mecanismos de gestión de datos** duraderos y que aseguren altos niveles de **protección y seguridad**. Los avances en este sentido no deben ir en detrimento de la brecha digital que existe actualmente en los contextos rurales, al contrario, deben tener como objetivo ser más **inclusivos y reducir la carga administrativa** para propietarios de

propiedades forestales y agroganaderas. Por otro lado, las políticas de desarrollo rural sostenible y de ordenación del territorio deberían apoyar una ocupación organizada de las zonas forestales y rurales, así como garantizar la provisión de servicios de calidad. Estas políticas beneficiarían también a la población rural, especialmente si se combinan con estrategias para **aumentar la concienciación sobre la importancia de los bosques y de sus actividades** agroganaderas asociadas, como el pastoreo.



LAS POLÍTICAS DEBEN IMPULSAR NUEVAS ESTRATEGIAS PARA REVITALIZAR LAS ZONAS RURALES Y FORESTALES, APROVECHANDO LOS RECURSOS Y CONOCIMIENTOS EXISTENTES. LAS TECNOLOGÍAS PUEDEN DESEMPEÑAR UN PAPEL FUNDAMENTAL EN ESA TRANSICIÓN.

También deben definirse políticas que **faciliten la adopción rápida de los avances tecnológicos** para la gestión de los incendios forestales, **fomentando la participación de las empresas privadas** -actualmente, muy limitada-, y **mejorando la logística y la coordinación** de medios.

Por último, se deben promover **marcos de colaboración** entre la administración pública, el sector privado y la ciudadanía para las acciones de prevención, control y recuperación asociadas a los incendios forestales. Estas estrategias deberían tener como objetivo establecer procedimientos de comunicación y bases de datos compartidas a diferentes escalas, desde el nivel local hasta el supra regional.



Figura 3. Vigilancia de ganado con control remoto.
Fuente: Pixabay



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RECOMENDACIONES

Gestión forestal sostenible

- Asignar valor de mercado a todos los servicios de los ecosistemas forestales. Canalizar los beneficios a través de mecanismos de ingresos adecuados que favorezcan la implementación de medidas para prevenir incendios.
- Promover el aprovechamiento sostenible de los recursos forestales y la concienciación social sobre el uso sostenible y los derechos de propiedad.
- Fomentar la creación de masas forestales diversas y multifuncionales mediante una silvicultura adecuada, el aumento de la variabilidad de especies y formaciones forestales, y fomentando el pastoreo.
- Permitir distintos usos del suelo forestal, como la combinación con especies agroforestales o con instalaciones de energía renovable.

Gestión de datos

- Establecer protocolos para recopilar, clasificar, almacenar y compartir datos entre las plataformas utilizadas por los distintos actores, de forma rápida y segura.
- Establecer mecanismos accesibles para la ciudadanía que les permitan aportar, consultar y utilizar datos.
- Establecer buenas prácticas de gestión de datos para reducir la carga administrativa de la ciudadanía.

Desarrollo rural sostenible y ordenación del territorio

- Regular la planificación urbanística en las zonas rurales y en la interfaz urbano-forestal para apoyar un aumento controlado de la población.
- Asignar recursos para garantizar la prestación de servicios de calidad en las zonas rurales.
- Asignar recursos para mantener y revitalizar las actividades agroganaderas tradicionales asociadas a los bosques.

I+D

- Impulsar el desarrollo y el uso de nuevas tecnologías para el diseño de estrategias de prevención de incendios y de restauración forestal más eficientes y adaptadas a los escenarios futuros.

Marcos de colaboración

- Establecer acuerdos para la coordinación entre la administración pública, las empresas privadas y las comunidades en la gestión de las acciones de prevención, control y recuperación asociadas a los incendios forestales a distintos niveles (de local a supra-regional).

Este informe se publica en el marco del proyecto DESIRA, financiado por la UE. Tiene como objetivo ofrecer recomendaciones a los responsables políticos sobre cómo apoyar la digitalización en el contexto de la gestión de los incendios forestales en Andalucía.

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Una década clave en materia de digitalización para el Maestrazgo y Gúdar-Javalambre

Este documento resume el trabajo realizado en el Living Lab (LL) de Maestrazgo y Gúdar-Javalambre. Uno de los objetivos de este LL es analizar cómo la tecnología puede ayudar a aumentar el atractivo del territorio. Para ello, se han organizado una serie de talleres, con el objetivo de analizar el pasado entorno a esta cuestión y tratar de imaginar qué cambios pueden producirse en los próximos 10 años. En el presente informe nos centramos en la visión de futuro y en la pregunta *¿cómo cambiarán la digitalización y la agenda 2030 las comarcas del Maestrazgo y Gúdar-Javalambre en 2031?* Para ello, se trabajó en torno a 4 escenarios partiendo desde la utopía hasta la distopía. A continuación se ofrece más información sobre los dos escenarios considerados más plausibles. En torno a dichos escenarios, surge el debate acerca de las políticas que podrán impulsar el atractivo de estos territorios y se plantea que la innovación digital es necesaria desde el punto de vista de las zonas rurales. Para ello, será necesaria una mayor formación en competencias digitales, especialmente para la población de edad avanzada, así como servicios de acompañamiento a las personas mayores en el proceso, con el objetivo de no dejar a nadie atrás.

CONTEXTO

Nuestro Living Lab se sitúa en Aragón, en concreto en las comarcas turolenses del Maestrazgo y Gúdar-Javalambre. Ambas zonas se caracterizan por tener una gran dispersión territorial entre sus pueblos con una baja densidad de población, representando menos del 1% de la población regional en un territorio que ocupa el 7,44% de la superficie de Aragón. En términos de digitalización, España ocupa el puesto 11 de los 28 Estados miembros de la UE en la edición 2020 del Índice de Economía y Sociedad Digital (DESI). En los últimos diez años, las autoridades públicas nacionales y regionales han desarrollado políticas públicas, proyectos y acciones para promover el desarrollo de la sociedad de la información en todo el país y la región, respectivamente.

Sin embargo, a pesar de las numerosas iniciativas en favor de la cobertura de la banda ancha y a pesar de los buenos resultados del país en general, ambas comarcas están muy afectadas por las denominadas zonas blancas y grises (es decir, zonas sin conectividad o con degradación del servicio debido al uso de tecnología de conexión obsoleta).

La complicada orografía de este territorio, con zonas montañosas, una gran masa forestal, grandes nevadas o fuertes tormentas, dificulta la comunicación y el acceso a la digitalización. Situación que ha quedado aún más expuesta a raíz de la pandemia sanitaria.

Además, aunque España está relativamente bien posicionada en términos de servicios públicos digitales y datos abiertos, las competencias digitales siguen siendo un problema para un alto porcentaje de la población de edad avanzada.

En general, se tienen grandes expectativas en torno a la posibilidad de lograr la infraestructura esperada. Hay que impulsar la digitalización y la implantación de nuevas tecnologías para dar un verdadero salto hacia la transformación digital y generar productos de mayor valor añadido. La accesibilidad es fundamental y la banda ancha de alta calidad es necesaria en primer lugar para mejorar las actuales deficiencias en las comunicaciones.

ENFOQUE UTILIZADO

A la hora de tratar de imaginar escenarios futuros, la pregunta con la que se trabajó fue *¿Cómo la digitalización y la agenda 2030 cambiarán el Maestrazgo y Gúdar-Javalambre en 2031?* Para ello, se organizó un evento híbrido, en formato presencial y online, con destacados representantes del territorio implicado.



ESTA DÉCADA ES CLAVE PARA NUESTRO LIVING LAB. SE ESPERA QUE UNA MEJORA EN LA DIGITALIZACIÓN HAGA MÁS ATRACTIVO EL TERRITORIO PARA LOS VISITANTES Y FUTUROS HABITANTES.

Siguiendo la metodología del proyecto DESIRA, se identificaron los parámetros sociales, tecnológicos, medioambientales, económicos y políticos externos e internos (impulsores del cambio) que pueden intervenir en los diferentes escenarios. A partir de estos factores, se desarrollaron cuatro hipótesis que dieron lugar a cuatro escenarios: partiendo desde la distopía y la utopía, hacia dos escenarios más plausibles.

ESCENARIOS DESARROLLADOS

Los dos escenarios principales utilizados para este LL son los dos considerados como más plausibles, es decir, ni el distópico, ni el utópico. En el primero, los posibles impactos positivos de la digitalización no han mejorado el futuro de la zona en 2031. La densidad demográfica no cambia significativamente: el envejecimiento rural y la densidad de población son prácticamente los mismos. Aunque están surgiendo algunos nuevos servicios digitales, no están ligados al nivel de infraestructura requerido. Las cifras de empleo son las mismas, sin nuevas ofertas de trabajo, pero al menos la disponibilidad de mano de obra aún no es un problema preocupante. La región no ha sabido captar la atracción de los jóvenes y la administración local no ha conseguido ganar importancia. De hecho, el territorio tiene la sensación de haber sido olvidado.

En el segundo escenario, los impactos positivos de la digitalización sí han mejorado el futuro de la población local en 2031. A pesar de que la situación demográfica sigue siendo la misma y de que el envejecimiento sigue siendo un problema para las comarcas, están surgiendo nuevas aplicaciones y servicios digitales y se están implementando nuevos servicios gracias a una mejor conectividad y acceso a la banda ancha. Entre dichas aplicaciones se encuentran las que implican una relación con las Administraciones, así como las educativas. Incluso una nueva aplicación para la renovación de viviendas previamente abandonadas. Los cambios en las condiciones climáticas extremas del territorio han dado lugar a nuevas actividades económicas. Gracias a la mejora de las infraestructuras rurales, los servicios básicos y la conectividad de banda ancha, se produce un ligero aumento del empleo y la gente puede teletrabajar, lo que también contribuye a aumentar el número de habitantes que han decidido trasladarse de las zonas urbanas a las rurales. Se consigue una implicación nacional que se traduce en nuevas estrategias y financiación para la prestación de servicios.



Imagen del primer taller realizado, en mayo de 2021, en la localidad de Mirambel

DEBATE GENERADO

El contexto de este LL es complejo, como ya se ha explicado brevemente. La dispersión y distribución territorial de ambas comarcas es una de las razones de las dificultades encontradas hasta ahora, siendo un territorio extenso y despoblado con una gran riqueza natural y cultural y con una infraestructura deficiente desde el punto de vista tecnológico. El número de habitantes no es lo suficientemente alto y, estratégicamente, no son rentables para las grandes empresas.

Estas dificultades afectan a las poblaciones rurales y provocan una mala percepción del medio rural como lugar potencial de implantación de iniciativas empresariales. Parece que el modelo está agotado geográficamente, con recursos infrautilizados. El objetivo final es poder animar realmente a la gente a trasladarse a las zonas rurales para frenar la despoblación y tratar de evitar la desaparición y el abandono de los pueblos poco habitados.

Además, es necesario dar un giro al discurso, dejar de hablar de la "España vaciada" y empezar a vender mejor el territorio.



LA PANDEMIA DE LA COVID-19 HA DEMOSTRADO QUE LA DEFINICIÓN DE BANDA ANCHA UTILIZADA EN LOS ÚLTIMOS AÑOS HAYA RESULTADO INSUFICIENTE PARA QUE LOS CIUDADANOS Y LAS EMPRESAS PUDIERAN OPERAR EFICAZMENTE CON LA PROLIFERACIÓN DE CONFERENCIAS, REUNIONES A DISTANCIA, TRABAJO REMOTO, APRENDIZAJE ELECTRÓNICO, COMPRAS EN LÍNEA Y SERVICIOS DE ENTRETENIMIENTO QUE SE HAN CONVERTIDO EN PARTE DE LA VIDA COTIDIANA.

En términos de estrategias recientes, cabe señalar que los sectores agrario y forestal cuentan con una estrategia de digitalización lanzada en 2019 que se espera que tenga un gran impulso en los próximos años gracias también a los planes

de recuperación surgidos tras la crisis sanitaria.

En julio de 2020 se presentó la Agenda Digital Española, España Digital 2025, con el objeto de ayudar a la transformación

digital del país garantizando la conectividad digital, desplegando el 5G, reforzando la ciberseguridad y digitalizando la administración pública y a las empresas.

Poco antes, en junio de 2020, Aragón presentó la Estrategia Aragonesa para la Recuperación Social y Económica con el objetivo de poner en marcha un programa para combatir los efectos de la crisis social y económica provocada por la pandemia. Esta estrategia incluye líneas específicas para impulsar la digitalización, facilitar el acceso a las infraestructuras y ofrecer los servicios de formación necesarios para que la transformación digital se haga realidad.

Por lo tanto, el debate no se centra en la necesidad de nuevas políticas, sino en la necesidad de centrarse en aquellas políticas que sean capaces de **impulsar y aumentar el atractivo** del territorio, impulsando también de manera más fehaciente la vida en las zonas rurales. La innovación digital es necesaria desde el punto de vista del medio rural. Para ello, será necesaria una mayor **formación en competencias digitales**, especialmente para la población de edad avanzada, reforzada con **servicios de acompañamiento** a las personas mayores, con el objetivo de no dejar a nadie atrás.

Las recomendaciones que se enumeran a continuación tratan de abarcar una implantación equilibrada de los servicios a distancia que se puedan ofrecer por la Administración, servicios médicos y entidades educativas en el territorio.

Incluso el metaverso (espacio de realidad virtual en el que los usuarios pueden interactuar con un entorno generado por ordenador y con otros usuarios) podría ser una opción futura para actividades como compras, clases a distancia y consultas médicas.



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RECOMENDACIONES

Impulsar y aumentar el atractivo del territorio

- El territorio tiene que ser capaz de mejorar su imagen en términos de comunicación. En otras palabras, tiene que ser capaz de "vender" mejor el atractivo del territorio y utilizar las herramientas digitales a su alcance para ello.
- En este sentido, se aconseja un cambio de discurso desde el interior, rompiendo el discurso de los últimos 50 años. Es el momento de poner este territorio en el mapa.

Fomentar la vida en el medio rural

- El horizonte al que se enfrentan las futuras generaciones preocupa, por la falta de oportunidades para ellas. Por ello, la digitalización debe contribuir a aumentar el atractivo de las zonas rurales y de la vida en los pueblos, al tiempo que se centra en la protección de los recursos naturales y del medio ambiente.
- Con las nuevas posibilidades del trabajo a distancia, creemos que esta recomendación debería ser una de las primeras en ponerse a prueba.

Diseños aplicados desde la óptica de las áreas rurales

- Sería interesante planificar desde el punto de vista de los pueblos y las zonas rurales en lugar de las ciudades.
- Con beneficios fiscales especiales para fomentar la inversión en innovación y digitalización.

Formación en competencias digitales

- Es necesaria la inclusión digital de todos los ciudadanos, por lo que también se requiere equipamiento y formación para lograr un aumento de la alfabetización digital y el uso de internet en los hogares para reducir las brechas digitales existentes.

Introducir un servicio de agentes facilitadores para las personas mayores

- Para lograr realmente una óptima transformación digital y especialmente, para no dejar a nadie atrás, es necesario acompañar a las personas mayores en el uso de todos los nuevos servicios digitales emergentes.
- Para ello, recomendamos introducir personas de enlace, agentes facilitadores que sean la conexión entre la población que lo necesita y los nuevos servicios digitales implantados.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalization in the context of rural attractiveness in Aragón (Spain)

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La numérisation de la production viticole en France

Cette note d'orientation présente les résultats d'entretiens et d'ateliers avec des parties prenantes réalisés au sein du Living Lab (LL) Inno'vin, en Région Nouvelle-Aquitaine, France. La question support des scénarios de ce LL était : « **A quoi ressemblera la viticulture française en 2031 en lien avec l'évolution du numérique ?** »

Dans ce contexte, deux scénarios narratifs ont été élaborés. Le scénario « meilleur mais pas le meilleur » (MpM) considère une offre très diversifiée de technologies numériques, l'acceptation de certaines technologies, une formation efficace sur les technologies numériques et la gestion des données, et la mise en œuvre de technologies numériques de production de vin avec des impacts socio-économiques et environnementaux positifs. Le scénario « pire mais pas le pire » (PpP) considère une offre très diversifiée de technologies numériques, l'acceptation de certaines technologies, une formation de base sur les technologies numériques et la gestion des données, et une fracture numérique claire concernant la mise en œuvre des technologies numériques de production de vin. Cinq recommandations politiques centrales sont proposées sur la base des suggestions des scénarios.

CONTEXTE

Le LL Inno'vin est un cluster viticole qui regroupe près de 180 acteurs de la filière. Il accompagne les entreprises dans leurs projets d'innovation et a contribué avec succès à plus de 100 projets depuis 2010, dans le but de trouver des solutions pour relever les défis de la filière viti-vinicole. Inno'vin favorise la compétitivité des entreprises de la filière viti-vinicole, contribue à leur développement économique et au maintien de leur position de leader.

L'objectif est de comprendre les enjeux de la numérisation dans la chaîne de valeur du vin ainsi que les impacts et les besoins locaux pour l'élaboration de politiques publiques. Le numérique est considéré comme un outil pouvant répondre à de multiples enjeux ou besoins. La filière viti-vinicole française s'articule autour de deux enjeux majeurs : (1) la transition agro-écologique du vignoble avec une réduction des pesticides et des impacts environnementaux et (2) la compétitivité des vins français sur les marchés nationaux et internationaux, la numérisation entraînant le renouvellement de liens avec les consommateurs et la désintermédiation.

La filière viti-vinicole, comme l'agriculture en général, s'est numérisée très rapidement (dématérialisation des déclarations PAC, stations météo, GPS) et continue de se digitaliser, avec pour la plupart des outils basiques et génériques. Cependant, depuis plusieurs années, la diffusion des technologies numériques relatives à la vigne se ralentit en raison des spécificités du secteur. Les outils numériques bien adaptés ne sont pas encore disponibles sur le marché (le plus souvent les innovations sont encore au stade de prototypage).

En amont de la chaîne de valeur, il existe plusieurs niveaux d'adoption des outils numériques, en fonction d'abord de l'appellation viticole, puis du type de vignobles appartenant à des groupes financiers ou à des familles. En aval, les commerçants investissent depuis des années dans les technologies numériques pour le marketing et la vente, tandis que les producteurs sont nouveaux sur cette question.

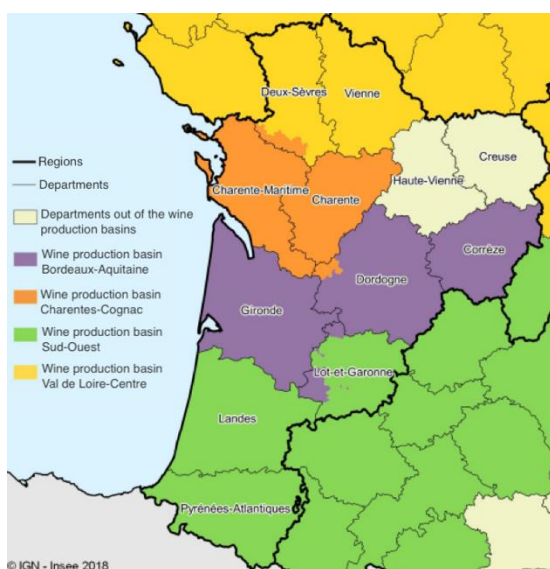


Figure 1. Bassins viticoles en Nouvelle-Aquitaine
Source : INSEE, 2018

APPROCHE DE LA RECHERCHE

La question de scénario discutée avec les acteurs des deux ateliers est la suivante : « **A quoi ressemblera la viticulture française en 2031 en lien avec l'évolution du numérique ?** »

Les parties prenantes impliquées comprenaient des agriculteurs, des coopératives, des syndicats d'agriculteurs, des chercheurs, des conseillers politiques, des fondateurs de start-up Agritech et des conseillers agricoles.

Ces ateliers ont suivi la méthodologie STEEP où la discussion s'est concentrée sur les aspects sociaux, technologiques, environnementaux, économiques et politiques liés aux impacts de la technologie numérique.



UN EXERCICE OUVERT ET PARTICIPATIF A ETE MENE AVEC LES PARTIES PRENANTES POUR IDENTIFIER LES MOTEURS DU CHANGEMENT ET LES EVOLUTIONS FUTURES PLAUSIBLES

Au cours de l'atelier en ligne tenu en janvier 2022, l'élaboration de récits de scénarios a été réalisée en définissant les moteurs du changement et en identifiant les évolutions futures plausibles.

Tout d'abord, les participants se sont mis d'accord sur la version finalisée suivante de la question de scénario : « **A quoi ressemblera la viticulture française en 2031 en lien avec l'évolution du numérique ?** ».

Ainsi, un exercice de prospective ouvert et participatif a été réalisé pour répondre à cette question. Les participants ont pu identifier les moteurs du changement et discuter des évolutions possibles de ces moteurs.

Ensuite, l'équipe LL a travaillé sur deux scénarios dits intermédiaires ("scénario meilleur mais pas le meilleur" et "scénario pire mais pas le pire") caractérisés par des évolutions différentes et plausibles des moteurs socio-économiques, environnementaux, politiques et technologiques. Deux scénarios extrêmes (faisant référence à des situations « utopiques » et « dystopiques ») ont également été décrits.

SCENARIOS DEVELOPPES

Comme nous avons utilisé la méthodologie STEEP, les discussions sont allées bien au-delà de la simple technologie numérique et ont abordé des questions telles que les politiques et les connaissances environnementales, ainsi que la structure de pouvoir plus globalement dans l'industrie du vin.

Dans le scénario « meilleur mais pas le meilleur » (MpM), la numérisation a amélioré le processus de

Domaine	Facteurs de changement
Social	▪ Démographie de la population en viticulture ▪ Demande pour une viticulture plus écologique ▪ Acceptabilité des résidents locaux sur l'apport des nouvelles technologies dans les vignes ▪ Formation de la main d'œuvre
Technologique	▪ Partage de données/Interopérabilité ▪ Accès aux évolutions technologiques
Économique	▪ Globalisation vs Local
Environnemental	▪ Multiplication des événements climatiques extrêmes ▪ Neutralité carbone de la viticulture
Politique	▪ Rôle des autorités publiques dans l'adoption des nouvelles technologies appliquées aux vignes ▪ Législation sur le management de l'industrie du vin

Figure 2. Facteurs de changement identifiés

Source : Atelier scénario avec les partenaires d'Inno'vin

vinification en France. En amont de la filière viticole, elle a contribué à l'adaptation des viticulteurs au changement climatique, en leur permettant d'anticiper les phénomènes météorologiques extrêmes, de gérer et contrôler 24h/24 ce qui se passe dans les vignes, de remplacer les désherbants chimiques par des robots de désherbage autonomes et d'anticiper les maladies plus rapidement. Les vins sont également plus respectueux de l'environnement qu'il y a dix ans et la plupart des établissements vinicoles ont réussi à devenir neutres en carbone. En aval de la chaîne de valeur, la numérisation a été un catalyseur pour améliorer les relations avec les consommateurs, apportant plus de transparence sur les pratiques et améliorant la façon dont le vin est vendu en ligne.

Dans le scénario « pire mais pas le pire » (PpP), le niveau de numérisation de la filière viticole française est faible pour de nombreuses raisons : les technologies numériques sont devenues plus complexes et plus chères, le système éducatif ne s'est pas transformé assez rapidement et les étudiants ne sont pas formés à l'utilisation des technologies numériques. Les infrastructures de partage des données sont peu développées et les viticulteurs sont réticents à partager leurs données. Faute de pouvoir tirer parti des technologies numériques, de nombreux viticulteurs n'arrivent pas à maintenir la qualité de leur vin.

DISCUSSION SUR LES POLITIQUES PUBLIQUES

La discussion dans l'atelier autour des moteurs de changement et des défis pour la viticulture et la chaîne de valeur du vin en France a permis d'identifier les besoins locaux en matière d'élaboration de politiques numériques.

Tout d'abord parmi les moteurs de changement identifiés par les participants, on note, les exigences sociétales croissantes pour une viticulture neutre en carbone ou respectueuse de l'environnement, et les tendances imprévisibles du changement climatique (i.e. des événements météorologiques extrêmes). Ceux sont les facteurs de motivation actuels les plus importants pour la transition agroécologique dans le secteur du vin. La politique numérique peut avoir une influence significative sur le niveau de numérisation et sa capacité à répondre aux demandes sociales liées à ces questions. Parallèlement des financements publics et d'autres ressources dédiées aux préoccupations environnementales, peuvent être mobilisés pour le développement de la numérisation.

En second lieu, les politiques publiques jouent un rôle important dans l'adoption des nouvelles technologies appliquées aux vignobles, y compris le financement public pour encourager l'adoption des nouvelles technologies numériques, la législation pour autoriser, restreindre ou même interdire l'utilisation de certaines technologies dans des conditions spécifiques, les aides pour garantir l'égalité l'accès aux développements technologiques, la formation de la main-d'œuvre, la réglementation du partage et de l'interopérabilité des données, etc.

Troisièmement, l'acceptabilité des résidents locaux quant à l'utilisation des nouvelles technologies dans la production viticole doit également être prise en compte. Des améliorations peuvent être apportées par des politiques favorisant l'éducation numérique des citoyens, la transparence des pratiques agricoles et la communication des apports de la numérisation auprès des résidents et des consommateurs locaux.

Enfin, la législation sur les définitions et les normes de qualité et de classification des vins est un facteur d'influence particulier mais essentiel pour ce secteur. Des efforts doivent être faits pour éliminer et prévenir les préjugés potentiels contre l'utilisation des technologies numériques, comme par exemple, dans l'évolution du système d'appellation d'origine contrôlée (AOC), et les restrictions législatives de la viticulture industrielle par rapport à la viticulture de terroir.



L'ELABORATION DES POLITIQUES PEUT ETRE TRES IMPORTANTE POUR LA NUMERISATION DANS LE SECTEUR DU VIN EN INFLUENÇANT LES MOTEURS DU CHANGEMENT, NON SEULEMENT POUR LE DEVELOPPEMENT ET L'ADOPTION DES TECHNOLOGIES NUMERIQUES, MAIS AUSSI POUR L'ACCEPTABILITE SOCIETALE DE L'UTILISATION DES TECHNOLOGIES NUMERIQUES DANS UN CONTEXTE SOCIOPOLITIQUE SPECIFIQUE.

Les principaux enjeux pour Inno'vin sont liés à l'augmentation de l'âge moyen des personnes travaillant dans la viticulture, l'augmentation des phénomènes météorologiques extrêmes, la montée des attentes sociétales pour une filière viticole respectueuse de l'environnement et la multiplication des attaques ou procès intentés par des ONG ou des riverains contre des agriculteurs utilisant des machines autonomes. Les risques liés à la numérisation concernent les inégalités face aux technologies numériques en raison des différences d'accessibilité et de compétences numériques, les problèmes de sécurité des données, les restrictions législatives imposées à la viticulture industrielle utilisant la technologie numérique (par exemple, l'absence de droit de postuler à certains labels), etc. L'opportunité concerne le développement actuellement rapide des technologies numériques, et son grand potentiel pour contribuer à répondre aux demandes sociétales en matière d'environnement. Les différences entre les scénarios résident principalement dans leur niveau et capacité de numérisation (de faible à élevé) face aux enjeux et aux risques. Cependant, la conception des scénarios concerne également des arbitrages entre différents objectifs.



IL EST IRREALISTE D'ATTENDRE DES SOLUTIONS PARFAITES REPONDANT A TOUS LES DEFIS ET RISQUES, LA CONCEPTION DE SCENARIOS DOIT TENIR COMPTE DES COMPROMIS ENTRE DIFFERENTS OBJECTIFS.

Dans le cas d'Inno'vin, la contradiction la plus remarquable est que le développement d'une technologie numérique hautement intelligente est nécessaire pour pouvoir prédire les phénomènes météorologiques extrêmes ou atteindre des objectifs environnementaux. Cependant, le manque de population jeune travaillant dans la viticulture suggère que les aides publiques devraient être utilisées en premier lieu pour promouvoir des technologies simples et conviviales. Dans le cas contraire, on peut craindre une inégalité d'accès au numérique entre les différents types de vignobles. Le scénario MpM suggère une option politique mettant l'accent sur la formation des agriculteurs et la communication avec les résidents et les consommateurs pour promouvoir la transparence des pratiques agricoles. La deuxième priorité est le développement et la promotion d'une technologie numérique performante. Une adoption diversifiée des outils numériques dans différents types d'exploitations est admise. Le scénario PpP suggère les effets d'une version plus faible de cette option politique.



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OPTIONS DE POLITIQUE PUBLIQUE

Encourager le développement et l'adoption des technologies numériques dans la viticulture et l'industrie du vin

- Doter la recherche et à l'innovation sur les technologies numériques d'un financement public pour réduire les impacts environnementaux et l'empreinte carbone.
- Encourager la recherche et l'innovation sur les technologies numériques pour renforcer la capacité à prévoir le changement climatique et les événements extrêmes.
- Établir une autorisation législative permettant aux agriculteurs de faire des expériences sur l'utilisation des outils numériques.
- Soutenir les agriculteurs dans l'adoption de la technologie numérique et en prévenir les risques potentiels.
- Promouvoir l'égalité d'accès aux outils et technologies numériques.

Augmenter le nombre d'agriculteurs capables d'utiliser les technologies numériques

- Promouvoir la formation professionnelle et l'engagement des jeunes dans l'agriculture.
- Améliorer l'attractivité des métiers du secteur viticole.
- Développer des programmes de formation appropriés pour la génération plus âgée.
- Développer des versions simplifiées ou automatisées de la technologie numérique.

Valoriser et communiquer sur l'apport de la numérisation

- Labelliser les apports du numérique à la réduction des impacts environnementaux, à l'amélioration de la neutralité carbone, etc.
- Communiquer avec les habitants et les consommateurs sur les avantages d'utiliser les technologies numériques.
- Développer des approches participatives (par exemple des auditions) impliquant différentes parties prenantes afin de prévenir les risques potentiels liés à la numérisation.

Influencer la législation nationale et internationale sur le secteur vitivinicole

- Promouvoir une prise en compte positive de la numérisation dans la définition et les normes du vin (ex. Appellation d'Origine Contrôlée - AOC).
- Reconnaître la juste place de la viticulture industrielle grâce aux technologies numériques.

Promouvoir le partage et la sécurité des données

- Faciliter la collecte et le partage de données entre les parties prenantes et tout au long des chaînes de valeur du vin.
- Création d'une plateforme open data dédiée au secteur du vin.
- Établir une réglementation sur l'utilisation et la sécurité des données.
- Établir un standard d'interopérabilité des données adapté au secteur du vin.

Cette note d'orientation est publiée dans le cadre du projet DESIRA financé par l'UE et vise à fournir des recommandations aux décideurs politiques sur la manière de soutenir la numérisation dans le contexte de la transition agroécologique de la viticulture en France.

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CONTEXTE

L'objectif est de déterminer comment les technologies numériques peuvent contribuer à l'émergence d'innovations en faveur de la transition agroécologique dans l'agriculture. Il s'agit de la diffusion d'outils numériques à utiliser par les acteurs agricoles et les communautés locales en faveur d'une agriculture plus durable pour différents types de produits et en lien avec la relocalisation de la production alimentaire.

The map illustrates the geographical distribution of agropoles in Burgundy and the network of stakeholders supporting them. The agropoles are marked with green location pins and labeled: Nevers, Mâcon, Mâconnais Sud Bourgogne, Beaune, Dijon, Yzeure, Besançon, and Agropôle Marault. The map is surrounded by logos of various stakeholders, including Robotics Valley, INRA Science & Impact, UB, Horticulture Bourgogne, Sayens, Vitagora, Bourgogne France-Comté numérique, Agropôle, Agri Sud Bourgogne, Terres Inovia, Food Tech, Repafes, Région Bourgogne Franche-Comté, Vosgrès Agropôle, DECA BFC, Région Bourgogne Franche-Comté, PMT, Mâconnais Sud Bourgogne, Vinipôle, Bourgognes, and Vitagora.

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APPROCHE DE LA RECHERCHE

La question des scénarios discutée avec les parties prenantes dans les deux ateliers est la suivante : **« Quelles seront les contributions du numérique pour accompagner la réduction des intrants en agriculture à horizon 2031 ? »**

Les parties prenantes comprenaient des agriculteurs, des coopératives, des syndicats d'agriculteurs, des chercheurs, des décideurs politiques, des fondateurs de startups de l'agroécologie et des conseillers agricoles.

Ces ateliers ont suivi la méthodologie STEEP où la discussion porte sur les aspects sociaux, technologiques, environnementaux, économiques et politiques liés aux impacts des technologies numériques.

Domaine	Facteurs de changement
Social	- Attentes sociétales sur une agriculture plus respectueuse de l'environnement - Formation - Évolution des modalités de conseil agricole
Technologique	- Partage de données/Interopérabilité/Souveraineté Robotique
Économique	- Valorisation économique des labels agroécologiques - Compétitivité et pertinence économique des solutions proposées
Environnemental	- Multiplication des événements climatiques extrêmes - Pression sur les ressources naturelles
Politique	- Droit à l'expérimentation sur un certain nombre de pratiques - Aides conditionnées aux services rendus pour l'environnement

Figure 2. Facteurs de changement identifiés

Source : Atelier scénario avec les partenaires d'Agronov

UN EXERCICE OUVERT ET PARTICIPATIF A ETE MENE AVEC LES PARTIES PRENANTES AFIN D'IDENTIFIER LES MOTEURS DU CHANGEMENT ET LES TRAJECTOIRES FUTURES PLAUSIBLES

Au cours de l'atelier en ligne qui s'est déroulé en janvier 2022, des scénarios narratifs ont été élaborés à partir de la définition des facteurs de changement et de l'identification de voies possibles pour l'avenir.

Tout d'abord, les participants se sont mis d'accord sur la question du scénario.

Un exercice de prospective ouvert et participatif a ensuite été mené pour répondre à cette question. Les participants ont pu identifier les moteurs du changement et discuter de leurs évolutions possibles. Ensuite, l'équipe a travaillé sur deux scénarios dits intermédiaires (« meilleur mais pas le meilleur » et « pire mais pas le pire ») caractérisés par des évolutions différentes et plausibles des facteurs socioéconomiques, environnementaux, politiques et technologiques. Deux scénarios extrêmes (se référant à des situations "utopiques" et "dystopiques") ont également été décrits.

LES SCENARIOS DEVELOPPES

En raison de l'utilisation de la méthodologie STEEP, les discussions sont allées beaucoup plus loin que la technologie numérique et ont abordé des questions comme les politiques environnementales et les connaissances.

Dans le scénario « meilleur mais pas le meilleur » (MpM) la numérisation améliore la façon dont les intrants agricoles sont utilisés en France, et l'agriculture française réussit à réduire son utilisation de pesticides d'au moins 40 %. Un changement de paradigme est nécessaire pour passer de la protection curative des cultures à d'autres méthodes n'utilisant aucun pesticide chimique pour prévenir l'apparition ou le développement de ravageurs dans les cultures. Les

technologies numériques contribuent également à réduire la pression sur les ressources naturelles, bien qu'elles aient connu des adaptations diverses selon les secteurs et les acteurs. Un autre élément de changement est que les agriculteurs sont autorisés à faire des expériences et à améliorer leurs performances d'une manière locale dans la recherche de leviers pour réduire les intrants. L'innovation ouverte est omniprésente et les frontières entre scientifiques et praticiens s'estompent. La recherche universitaire et les solutions de terrain sont mieux rapprochées.

Dans le scénario « pire mais pas le pire » (PpP), la numérisation aide l'agriculture française à réduire l'utilisation des pesticides de moins de 20%, et le manque de culture numérique reste un fardeau pour l'agriculture française. Les agriculteurs ne reçoivent pas une formation adéquate sur l'utilisation appropriée des intrants, des technologies numériques et des données. Les conseillers agricoles ne maîtrisent que partiellement les outils et les technologies numériques et ne fournissent pas de conseils appropriés. Les paiements pour services environnementaux sont insuffisants pour permettre au secteur d'investir pleinement dans des solutions numériques favorisant les services environnementaux de l'agriculture. De plus, le potentiel de la robotique s'avère limité (p. ex., trop coûteux et axé principalement sur la question de la main-d'œuvre). Les agriculteurs n'ont pas l'autorisation réglementaire de mener des expériences. Ils peuvent seulement s'appuyer que sur des références et des normes qui ne sont parfois pas adaptées à leur situation.

DISCUSSION SUR LES POLITIQUES PUBLIQUES

La discussion menée au cours de l'atelier sur les moteurs du changement pour la réduction des intrants dans l'agriculture française suggère les trois niveaux suivants de besoins locaux pour l'élaboration de politiques numériques :

(1) Les attentes sociétales pour une agriculture plus respectueuse de l'environnement, la sensibilisation accrue aux pressions sur les ressources naturelles et les tendances imprévisibles des changements climatiques et en particulier des phénomènes météorologiques extrêmes, sont les facteurs les plus importants qui motivent aujourd'hui la transition agroécologique et la réduction des intrants dans l'agriculture. Les technologies numériques ont un grand potentiel pour contribuer à répondre aux demandes sociales liées à ces questions. Des financements publics et d'autres ressources politiques liées aux préoccupations environnementales peuvent être mobilisés pour le développement de cette numérisation.

(2) Le développement proprement dit de la numérisation concerne l'amélioration des technologies numériques, en particulier la robotique, la formation des agriculteurs et des conseillers agricoles, le partage sécurisé et l'interopérabilité des données, ainsi que l'évaluation et la communication des contributions de la numérisation. Ces éléments font tous partie des moteurs sélectionnés par les participants, demandant un financement public et d'autres soutiens tels que des réseaux de partenariats, de plateformes et d'expertise. Plus précisément, les participants à l'atelier ont souligné le droit des agriculteurs à faire des expériences, et ont affirmé qu'il s'agissait d'un facteur critique pour promouvoir une innovation ouverte adaptée aux besoins locaux dans le contexte particulier de la région BFC

(3) Les participants estiment que la compétitivité et la rentabilité économique des solutions numériques devraient également être prises en compte. Afin de rendre les contributions de la numérisation plus visibles, des solutions différentes des moyens traditionnels tels que l'étiquetage, les prix, etc., devraient également être développés, par exemple, l'évaluation économique des labels agricoles sur les marchés et les paiements pour les services environnementaux. Une législation et des décisions politiques sont donc nécessaires.

LA COMPÉTITIVITÉ ET LA RENTABILITÉ ÉCONOMIQUE DES SOLUTIONS NUMÉRIQUES DEVRAIENT ÉGALEMENT ÊTRE PRISES EN COMPTE. L'ÉLABORATION DES POLITIQUES DOIT FAVORISER L'ÉVALUATION ÉCONOMIQUE DES CONTRIBUTIONS DE LA NUMÉRISATION AFIN DE LES RENDRE PLUS VISIBLES.

Pour Agronov, les principaux défis concernent principalement les contraintes liées aux performances environnementales, à l'augmentation des phénomènes météorologiques extrêmes et aux pressions des marchés en termes de compétitivité économique. Les risques liés à la numérisation incluent par exemple l'accès inégal aux technologies numériques, le problème de sécurité des données, les contraintes législatives imposées à l'agriculture industrielle utilisant la technologie numérique, etc. Il est possible que le développement actuel rapide des technologies numériques puisse contribuer fortement à l'exigence croissante d'une agriculture respectueuse de l'environnement. Les différences entre les scénarios sont principalement liées aux niveaux et capacités de numérisation (de faible à élevée) face aux défis et aux risques, mais leur conception repose également sur des compromis entre les différents objectifs.

COMME IL EST PEU RÉALISTE DE S'ATTENDRE À DES SOLUTIONS PARFAITES POUR TOUS LES DÉFIS ET RISQUES IDENTIFIÉS, LA CONCEPTION DES SCÉNARIOS DOIT INTÉGRER DES COMPROMIS ENTRE LES DIFFÉRENTS OBJECTIFS.

Dans le cas d'Agronov, le développement de la robotique, des machines automatisées et d'autres technologies numériques intelligentes est nécessaire pour prédire les phénomènes météorologiques extrêmes ou atteindre les objectifs environnementaux. Cependant, il peut être contradictoire avec le faible niveau de formation numérique chez les agriculteurs, le rejet par la société de la robotique et des productions industrialisées pour des raisons environnementales, et la faible compétitivité du système en raison du coût élevé de la robotique, et d'autres aspects.

Le scénario MpM suggère un choix politique mettant l'accent sur la formation des agriculteurs et des conseillers agricoles, la communication avec les résidents et les consommateurs, ainsi que le développement de l'évaluation économique et des paiements pour les services environnementaux, afin d'améliorer la visibilité des contributions de la numérisation. La deuxième priorité est le développement et la promotion d'une technologie numérique à haute performance. Et l'adoption diversifiée des outils numériques dans différents types d'exploitations agricoles. Le scénario PpP est en fait une version plus faible de ce choix politique.



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OPTIONS DE POLITIQUE PUBLIQUE

Encourager le développement et l'adoption de technologies numériques pour réduire l'utilisation des intrants en agriculture

- Consacrer des financements publics pour la recherche et l'innovation dans les technologies numériques afin de réduire l'utilisation des intrants dans l'agriculture et les pressions exercées sur les ressources naturelles (eau, sol, biodiversité, etc.).
- Encourager la recherche et l'innovation dans les technologies numériques afin de renforcer la capacité de prédire les changements climatiques et les événements extrêmes.
- Aider les agriculteurs à adopter les technologies numériques et à prévenir les risques potentiels.
- Promouvoir l'égalité d'accès aux outils et technologies numériques.

Former les agriculteurs et les conseillers agricoles

- Promouvoir la formation professionnelle préparant les nouveaux agriculteurs.
- Améliorer l'attractivité du travail dans le secteur agricole.
- Développer des programmes de formation et des plateformes de communication pour les conseillers agricoles.
- Élaborer des programmes de formation appropriés pour les générations les plus âgées.
- Développer une version simplifiée ou automatisée des technologies numériques.

Valorisation et communication sur les apports de la numérisation

- Communiquer avec les résidents et les consommateurs sur les avantages de l'utilisation des technologies numériques.
- Améliorer la législation et chercher les soutiens politiques pour transformer les contributions de la numérisation en avantages économiques pour les agriculteurs, par exemple l'évaluation économique des labels agricoles, les paiements pour les services environnementaux, etc.
- Développer des approches participatives impliquant différentes parties prenantes afin de prévenir le risque potentiel de numérisation.

Encourager l'innovation ouverte ascendante en agriculture

- Autoriser légalement les agriculteurs à réaliser des expériences d'utilisation d'outils numériques.
- Créer des réseaux associant plusieurs parties prenantes pour faciliter l'innovation des agriculteurs et le partage d'expériences avec d'autres parties prenantes.

Promouvoir le partage et la sécurité des données

- Faciliter la collecte et le partage de données entre les parties prenantes et le long des chaînes de valeur.
- Créer une plateforme de données ouvertes dédiée au secteur agricole
- Réglementer l'utilisation et la sécurité des données
- Créer une norme d'interopérabilité des données adaptée au secteur agricole.

Cette note d'orientation est publiée dans le cadre du projet DESIRA financé par l'UE et vise à fournir des recommandations aux décideurs politiques sur la manière de soutenir la numérisation dans le contexte de réduire les intrants agricoles pour la transition agroécologique en France.

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Digitalisering in de Vlaamse Veehouderij

Deze beleidsnota is gebaseerd op workshops in het kader van het DESIRA-project van de EU, uitgevoerd in Vlaanderen. Het centrale thema is de mogelijke maatschappelijke impact van het meten van ammoniakemissies op landbouwbedrijven. Sensortechnologieën die in ontwikkeling zijn, kunnen inzicht geven in de emissies die landbouwbedrijven produceren, en zo beleidsmakers mogelijkheden bieden om de milieuimpact van de landbouw te verminderen.

In de workshops, die aan de basis staan van deze beleidsnota, zijn twee scenario's (één positief en één negatief) uitgewerkt voor de Vlaamse veehouderij. Hier hebben een reeks aan belanghebbenden binnen de veehouderij aan meegewerkt. In beide scenario's vormt een crisis in de veehouderij (financieel en rond milieuimpact) de basis voor veranderingen.

Context

Deze beleidsnota is gebaseerd op workshops die gehouden zijn voor het Europese H2020 DESIRA project. Het centrale thema van deze workshops is de mogelijke impact van het meten van ammoniakemissies op boerderijen, met behulp van nieuwe sensortechnologie. Sensors die in ontwikkeling zijn voor de veehouderij kunnen in de toekomst inzicht bieden in de emissies van individuele boerderijen, en daarbij beleidsmakers mogelijkheden bieden voor nieuw milieubeleid.

Tot nu toe is het beleid gericht geweest op een mix van generieke en meer individuele maatregelen, maar gebaseerd op een gemiddelde uitstoot van boerderijen. Emissies zijn echter variabel, en boerderijen kunnen onderling verschillen in de uitstoot van emissies per dierplaats.

Beleid is tot nu toe ook nog niet in staat geweest om de ammoniakemissies afdoende te verminderen. Emissies blijven te hoog en hebben daardoor een negatieve impact op nabijliggende natuur.

Nieuw milieubeleid wordt op dit moment geschreven. Deel van het overheidsbeleid is de financiering van meettechnologie om ammoniakemissies beter in kaart te brengen.

Dit is waar deze beleidsnota een contributie doet. Voor deze beleidsnota hebben we met belanghebbenden gesproken over de mogelijke impact van het meten van emissies op bedrijfsniveau.



Onderzoeksaanpak

Ons onderzoek richt zich op de rol van digitalisering, en specifiek op sensortechnologie om ammoniakemissies te meten in de veeteeltsector in Vlaanderen.

De scenariovraag die in de twee workshops werd besproken, luidt als volgt: "Wat zal de impact van digitalisering en monitoring zijn op de ammoniakemissie in 2031?"



DIGITALISERING IS SLECHTS EEN ASPECT VOOR VEEHOUDERS. ER ZIJN ANDERE KWESTIES DIE VOOR LANDBOUWERS VOORRANG HEBBEN. DEZE MOETEN EERST AANGEPAKT WORDEN VOORDAT DIGITALE TECHNOLOGIE ECHT VOORDEEL OPLEVERT

Deze vraag is met de volgende belanghebbenden besproken op de workshops: boeren, landbouworganisaties, onderzoekers, beleidsadviseurs en bedrijfsadviseurs.

Deze workshops volgden de STEEP-methodologie, waarbij de discussie werd toegespitst op de sociale, technologische, ecologische, economische en politieke aspecten van deze technologie.

Ontwikkelde Scenario's

Omdat we de STEEP-methodologie gebruikten, werden de discussies vanzelf breder dan enkel de technologie zelf. Daarbij kwamen onderwerpen zoals milieubeleid en vormen van kennis aan de orde, maar ook bredere machtsstructuren in de veehouderij.

Daarbij werden vier verschillende scenario's uitgewerkt, waaronder een zogenaamd "beter maar niet het beste scenario" en een "slechter maar niet het slechtste scenario". Het eerste scenario was opgebouwd rond een crisis die in de varkenshouderij nu al zichtbaar wordt. Bij het ontwikkelen van dit scenario richtten de belanghebbenden zich op het feit dat dit soort crisissen radicale veranderingen in de veehouderijsector mogelijk zou maken.

Radicale veranderingen bieden kansen voor eerlijker prijzen, stabiliteit op de lange termijn, een integratie van data-gedreven beleid met de wetenschap, en de ontwikkeling van nieuwe vormen van landbouw en veeteelt. De integratie van data vergt een zekere aandacht, vooral betreffende de toegang tot data van boeren en wie er eigenaar is van deze data.



In het tweede minder optimistische scenario werd een soortgelijke crisisesignaleerd. In dit scenario leidt een gebrek aan langetermijnvisie in combinatie met ondoeltreffende beleidsmaatregelen echter tot stagnatie van de veehouderij. Ammoniakemissies worden in dit scenario niet adequaat aangepakt, en digitalisering heeft weinig impact.

In dit tweede scenario hielden de respondenten zich ook meer bezig met de rol van ammoniaksensortechnologieën. De grootste zorg van de respondenten was dat deze technologieën aan de landbouwers zouden worden opgedrongen voordat de landbouwers de nodige vaardigheden en kennis hadden ontwikkeld om deze technologieën te gebruiken.

Om deze reden is vooral gebrekkige kennis over digitalisering en ammoniakemissies een zorg van de deelnemers aan de workshop. De veehouderij wordt gezien als een sector die nog niet klaar is voor de impact van 'big data' en digitale technologie, vooral als het om ammoniakemissies gaat.

Mogelijkheden voor beleid

Tijdens de workshops werden verschillende mogelijkheden voor beleid besproken. In deze workshops gingen de discussies verder dan alleen digitalisering. De door de deelnemers voorgestelde beleidsmaatregelen bestrijken een reeks van mogelijke acties die beleidsmakers zouden kunnen maken om de veehouderij te ondersteunen.

De belangrijkste uitdagingen die tijdens de workshops naar voren zijn gekomen zijn: 1) lage landbouwinkomens; 2) onzekerheid over data-eigendom; 3) de dominantie van grote bedrijven in de agrovoedingsketen; 4) het gebrek aan wetenschappelijke zekerheid over agromilieueffecten; 5) het gebrek aan langetermijnbeleidsplannen voor agromilieuregelgeving; en 6) het gebrek aan digitale vaardigheden bij landbouwers.



EERLIJKE EN RECHTVAARDIGE AGROVOEDINGSSYSTEMEN VORMEN DE BASIS VOOR DE SUCCESVOLLE ADOPTIE VAN DIGITALE TECHNOLOGIE

In het algemeen wensten de deelnemers aan de workshop sterke maatregelen vanuit de overheid in de veehouderij. Deze maatregelen gaan ook verder dan een focus die louter gericht is op digitale technologieën.

Ze vormen echter wel de basis voor een 'eerlijke' transformatie van de veehouderij en zijn noodzakelijk om positieve effecten van de toepassing van digitale technologie te bewerkstelligen.

De deelnemers in beide scenario's identificeerden gelijke thema's, hoewel zij enigszins verschilden in de aanpak die werd voorgesteld voor de landbouw. Deze verschillen worden in de volgende paragrafen vermeld bij de beschrijving van de voorgestelde beleidsmaatregelen.

In het positieve scenario worden gunstige veranderingen in gang gezet door overheidsingrijpen in de agrovoedingsketen. Deze interventies zijn

gericht op het vaststellen van eerlijke prijzen die rekening houden met de kosten van milieuvriendelijke voedselproductie.

Eerlijke prijzen verschaffen landbouwers ook het nodige kapitaal om te investeren in digitale technologieën en milieuvriendelijke praktijken. Data-eigendom (door de landbouwers) is daarbij essentieel voor de ontwikkeling en het gebruik van digitale technologieën. Het winnen van vertrouwen van landbouwers in digitale technologieën is essentieel en moet volgens de deelnemers worden aangepakt.

In beide scenario's werd benadrukt dat de kennis over milieumaatregelen in de landbouw verbeterd moet worden. Met name praktische kennis voor landbouwers over hoe milieueffecten kunnen worden vermindert is op dit moment niet toereikend beschikbaar. Om deze kennis te ontwikkelen moet ook de wetenschappelijke kennis verder ontwikkeld worden.

Een agromilieubeleid dat rekening houdt met de lange termijn van de landbouw wordt ook gezien als een positieve verandering die landbouwers in staat zou stellen om te investeren in digitalisering. Deze stabiliteit zorgt dat investeringen ook meer kunnen opleveren voor de landbouwer.

Een laatste aandachtspunt zijn de digitale vaardigheden van landbouwers, die in de Vlaamse landbouwsector als ontoereikend worden beschouwd. Veel landbouwers zullen op dit moment waarschijnlijk niet in staat zijn om digitale technologie te Beleid kan hier een positieve verandering teweegbrengen door landbouwers manieren aan te reiken om digitale vaardigheden te ontwikkelen.



This policy brief was created under the terms and conditions of the Grant Agreement No. 818194 for the European Commission.

MOGELIJKHEDEN VOOR BELEID

Eerlijke prijzen

- Een interventie in de agrovoedingsketen, zodat landbouwers voor hun prijsvorming minder afhankelijk worden van de detailhandel in het bepalen van prijzen.
- Minimumprijzen vaststellen voor voedingsmiddelen die rekening houden met de kosten van het produceren van ecologisch en sociaal verantwoord voedsel.
- Overheidsingrijpen is essentieel om deze veranderingen door te voeren.

Eigenaar zijn van data

- Wetgevende kaders vaststellen die ervoor zorgen dat de boer eigenaar is van de data die op de boerderij worden geproduceerd.
- Zorgen dat de boer in kan zien welke data gedeeld wordt en met wie zij data delen.
- Overeenkomsten voor datadelen begrijpelijk maken voor de boer.

Milieubeleid

- Een transitie naar milieubeleid voor de lange termijn, waarbij boeren stabiliteit ervaren en milieubeleid grotendeels gelijk kan blijven voor enkele decennia.
- Dat houdt rekening met de investeringen van boeren die ook vaak decennia meegaan.

Digitale vaardigheden & kennis

- Het vormen van voorbeeldboerderijen rond digitalisering waar andere boeren ervaring kunnen opdoen en kunnen delen rond digitale landbouwpraktijken.
- Netwerken creëren rond deze voorbeeldboerderijen waar boeren samen werken rond digitalisering.
- Deze netwerken gebruiken om digitalisering van grotere groepen boeren te verbeteren.

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalization in the context of ammonia emissions in livestock farming in Flanders.

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