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Digitalisation and just transition - Research article

Engaging with barriers hampering uptake of digital tools

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Abstract. It is widely accepted that digitalisation can allow us to tackle the social, economic and even environmental challenges that agro-food systems are currently facing. There is a vibrant debate regarding the challenges one might face when adopting digital tools. This article engages in this discussion by exploring how barriers farmers encounter when implementing digital solutions manifest themselves as practical challenges farmers have to resolve. To do this, the article explores three cases in Latvia's beef farming sector. The article focuses on the following two questions: 1) what were the challenges that the groups of farmers faced while trying to implement the new solutions; 2) how did these challenges transform the initial solutions the farmers were trying to implement? The three cases represent three initiatives at various stages of development (an emerging cooperative of beef farmers; an unorganised attempt by farmers to develop joint digital marketing tools; an online shop developed and maintained by an individual enterprise). The article argues that there are multiple creative strategies for dealing with barriers to digitalisation, but studies focusing on different obstacles to digitalisation should also be mindful of pre-existing issues that hamper digitalisation, while simultaneously being impervious to purely digital fixes.

Keywords: digital tools, barriers, rural development, beef sector.

JEL codes: Q1, M31, O18.

HIGHLIGHTS

- Digital tools can be used to improve farmers' ability to reach out to consumers.
- Farmers have access to digital skills and technologies allowing them to implement digital tools in their daily activities.
- To benefit from the tools, farmers need a clear grasp of the links tying their business and the issues they are hoping these issues will resolve.

1. INTRODUCTION

It is widely accepted that digitalisation can allow us to tackle the social, economic and even environmental challenges that agro-food systems are cur-

rently facing (Barrett *et al.*, 2020; Fielke *et al.*, 2020). While there are more cautionary approaches listing the potential threats associated with the misuse of these technologies and overreliance on digital tools (Klerkx and Rose, 2020), the general agreement seems to be that these tools will play a pivotal role in sustainability transitions. Interest in and access to digital tools differs across various groups. This is likely to increase the digital divide – a situation where some parts of society benefit from these tools more than others (Schneider and Kokshagina, 2018; Dufva and Dufva, 2019). Thus, an in-depth understanding of how actors engage with and make use of these tools can help to limit misuse, and other potential negative side effects (especially those related to unequal adoption rate) of digitalisation, and to make use of the transformative potential associated with digitalisation. This highlights the importance of exploring how digital technologies are adopted by practitioners (Klerkx and Rose, 2020; Bronson, 2019). One area where the digital divide starkly manifests itself is when digital opportunities in rural and urban territories are compared.

There is a vibrant scholarly debate regarding the challenges one might face when adopting digital tools, suggesting a broad range of social and individual factors that can hamper the pace of the digital transition (see Bronson, 2019; Ferrari *et al.*, 2022). This article engages in this discussion by exploring how the various social, technological, commercial and regulatory (Ferrari *et al.*, 2022) barriers that farmers encounter when implementing digital solutions manifest themselves as practical challenges that must be resolved. To do this, the article explores three cases of digitally assisted commercialisation in Latvia's beef farming sector. The article focuses on the following two questions: 1) what were the challenges that the farmers faced while trying to implement the new solutions; 2) how did these challenges transform the initial solutions the farmers were trying to implement?

The three cases represent three commercial initiatives at various stages of development. The first case is an emerging cooperative of beef farmers looking for new retail channels (the cooperative). The second is an attempt to develop joint digital marketing tools by a group of farmers (the group). Finally, the third case is an online shop developed and maintained by an individual enterprise (the enterprise). In all three cases, the purpose of the practices and solutions that were adopted was to facilitate the farmers' ability to engage with customers and sell their products. The article has chosen to focus on the process of developing and implementing these solutions to illustrate the mundane entanglement of technological solutions, the specific needs of the farmers involved and the contextual arrangements in which their activities are embedded.

The article starts by providing a short overview of digitalisation and the beef sector in Latvia. It continues by outlining several groups of barriers that farmers can encounter when engaging with digital tools. The article subsequently describes the data used in the article and the three cases. This is followed by a section focusing on how different barriers manifest in practice. The article argues that there are multiple creative strategies for dealing with barriers to digitalisation, but studies focusing on different obstacles to digitalisation should also be mindful of pre-existing issues that hamper digitalisation, while simultaneously being impervious to purely digital fixes.

2. TRENDS OF DIGITALISATION IN LATVIA

Recent data suggest that rural digitalisation in Latvia can be viewed in contrasting ways. On the one hand, Latvia appears to be in a good position concerning digital infrastructure and e-services. On the other hand, digital transformation does not appear to be high on the policy agenda and some issues hamper rural digitalisation in particular. For instance, Latvia's digital strategy is outlined in the *Digital Transformation Guidelines for 2021-2027* (VARAM, 2020), a document that was prepared in 2020. However, while the guidelines mention the digital gap between rural and urban areas, little attention is paid to this issue in the descriptions of specific goals.

Similarly, the country performs well in rankings concerning digital public services and connectivity, but the population has comparatively poor digital skills (DESI, 2022). Furthermore, there are clear regional differences - skills are much better in urban centres. Likewise, despite overall broadband and mobile network coverage being high, there are pronounced differences in internet accessibility between rural and urban areas, largely determined by low population density and business activity. Internet usage in Latvia is increasing every year and 85.4% of the population used the Internet in 2019. However, there are regional disparities and, perhaps not surprisingly, regular internet usage is higher in urban areas, and lower in rural regions (Central Statistical Bureau of Latvia, 2019). What is more, Latvia is believed to be lagging in terms of the use of e-commerce by both businesses and individuals (OECD, 2021). DESI index illustrates that Latvia's enterprises are among the least active when it comes to integrating digital technologies into their everyday activities. This claim holds for most of the surveyed digital solutions (DESI, 2022). In fact, the digitalisation of the private sector is the worst-

performing area of the overall digital transformation making the adoption of digital technologies in the private sector a prominent yet unexplored research topic.

Finally, despite the creation of numerous state municipal platforms for the provision of digital services, and policy measures and support programmes aimed at facilitating digitalisation, not all social groups have been reached, meaning that some do not benefit from these developments. In conjunction, these factors can hamper the capacity of rural communities to make use of the opportunities offered by digitalisation, while simultaneously making them more vulnerable to the risks associated with the digital divide (DESI, 2022). This raises the question of what can be done to maximise the socio-economic benefits of digital transformation in rural areas while countering some of the potentially negative impacts. However, in addition to structural obstacles, one must also consider micro and meso-level barriers that prevent rural businesses and people living in rural areas from making the most of digital tools.

3. ADOPTION BARRIERS

The willingness to adopt new digital tools can vary between farms and differ from technology to technology (European Commission, 2018b). Researchers have pointed to several factors that can affect this process, such as skills (Adão *et al.*, 2022), initial investments (Bronson, 2019), real-life conditions, perceived rewards, etc. The diversity of relevant factors underlines that digitalisation is a complex process and thus, the factors that are considered when exploring the process should go beyond the technical nature of implemented solutions (Rijswijk *et al.*, 2023). Based on the results of the DESIRA project, Ferrari *et al.* (2022) suggest that there are four major categories of barriers and five categories of drivers that impact the ability of stakeholders to benefit from digital tools. The barriers are socio-cultural (barriers: demographic, distrust, fear, values, competence, complexity), technical (barriers: connectivity, dependability, usability, scalability), economic (barriers: cost, scale), and regulatory-institutional (barriers: data management, regulations).

- *Socio-cultural* barriers incorporate aspects rooted in the social practices and beliefs of the actors involved. This group of barriers also includes the socio-demographic trends and organisational structures affecting uptake. For example, engagement with digital tools is interlinked with trust and distrust in technologies, yet the level of trust is strongly dependent on knowledge and experience (Rijswijk *et al.*, 2023).

Likewise, there are studies illustrating an unequal distribution of digitalisation-related knowledge and advice (Fielke, 2020) facilitating the emergence of groups that might be harder to convince or might struggle to engage with emerging technologies.

- *Technical* barriers capture technical aspects that either require infrastructure that is not available to a farmer or is not compatible with the farmer's needs/ existing on-farm solutions. The concerns related to technical barriers are many and they can cover somewhat different issues. For example, some researchers have expressed doubts regarding the capacity of some technologies to sufficiently service the needs of farmers (Zhao *et al.*, 2019). Meanwhile, others have stressed the challenges related to access or unequal access to these technologies or the goods produced by the technologies (Fielke *et al.*, 2020).
- *Economic* barriers capture farmers' economic capabilities and economic needs. High costs are an issue for many of these technologies (see Zhao *et al.*, 2019), and developers of technologies primarily focus on farms that have the finances needed to adopt the technologies, resulting in different adoption rates among farmers (Bronson, 2019).
- The final group covers *regulatory-institutional* barriers. These mainly refer to a lack of a supportive regulatory-institutional environment (Hobos *et al.*, 2018). For example, as has been shown by Zhao *et al.* (2019) – transparency (an organisational approach that is often presented as a good practice in short supply chains) provided by blockchains can also be the source of a struggle to protect users' privacy.

The following chapters will explore how these barriers manifest themselves in practice.

4. THE DATA

The article is built on three cases that represent different attempts at commercially motivated digitalisation initiated by Latvian beef farmers. The three cases have been explored to a different level of detail, but they are connected via a set of discussions with the representatives of the beef farming sector organised by the authors between 2019 and 2022 as part of a living lab for the DESIRA project. The purpose of these discussions was to arrive at a joint understanding of how digitalisation could support the sector, strengthen its market position, and establish a more prominent position in the local food market. Thus, the selection of the cases was not motivated by pre-defined criteria. They were identified as part of a broader exploratory study and chosen post-

factum as illustrative examples of different strategies and associated successes and failures.

The data was gathered in two focus groups, several workshops, and joint excursions between 2020 and 2022. The workshops and focus groups were supplemented with interviews with representatives of the initiatives and with experts operating in the sector, and participant observation during the workshops themselves (e.g. taking field notes about the interactions between participants). It should be noted that the focus groups and workshops were not case-specific and tackled broader questions pertaining to digitalisation. The interviews, however, focused explicitly on the process and experience the initiatives had while implementing the digital tools in question. The interviews differed in length, however, in general, they were around one hour long.

The data were then iteratively analysed to identify the challenges limiting farmers' ability to fully benefit from digital tools, with the four categories of barriers as proposed by Ferrari *et al.* (2022) used as the analytical frame. Thus, the subsequent analysis is structured along the lines of the major factors that hamper the adoption of digital tools.

5. THE THREE CASES

The three cases considered in this article represent three attempts by beef farmers to introduce digital tools in their activities for commercial purposes.

The first case is a farmers' cooperative established in 2021 (henceforward referred to as the cooperative). The case represents an attempt to introduce a joint trading approach with a focus on the members' push to develop an online platform to attract and communicate with customers and align production and demand. The cooperative was started by a group of farmers each of whom had a separate consumer group that was contacted via email, WhatsApp, SMS or other means. It is one of two cooperatives that have recently emerged in the high-price beef sector. The ambition of the cooperative was to develop a local high-quality beef market and improve the coordination between farmers working in the market. The cooperative has been exploring ways the members of the cooperative could benefit from joint digital solutions: the cooperative has been developing a joint database of clients and a joint ordering system that would allow the members to organise their trade, production and logistics together and would offer customers one entry point for purchasing the goods produced by the coop. It was hoped that such a system would improve the members' ability to plan their production

processes. After making some investments in IT solutions and trying to develop the joint system, the coop has failed to centralise trade and farmers largely continue to engage customers separately. Thus, as it stands, the case has failed to reach its goals.

The second case is a group of farmers that came together to develop digital tools to communicate with customers (henceforward referred to as "the group"). Being part of the living lab in the DESIRA project, this group of farmers had a joint understanding of the challenge they have to address (inability to persuade consumers about the value [and associated price] of high-quality beef) and the instruments they could employ (the group was considering various digital tools). However, there was no shared vision of how exactly the issue could be resolved. While the group was interested in the issue (as attested by the personal experience of the participants with digital tools), the conversation was led by a small group of participants. Furthermore, discussions revealed important differences between participants – while some were looking for ways to use social media or similar tools to reach out to consumers, others were thinking about how state-run databases could be linked to increasing traceability of high-quality beef or discussing possibilities of using information exchange platforms to coordinate production planning (making production more efficient). Over time it became apparent that this group of farmers had a shared overall vision, but it struggled to agree on the details. Furthermore, the farms linked in the group represented substantial differences in size, technological sophistication, geographical location, etc.). Consequently, despite the time and effort invested, the group was unable to develop a plan that would be supported by everybody.

Finally, the third case is an individual farm that has developed an online shop (henceforward "the enterprise"). This online shop can be regarded as the next step in the shift of the farm towards trading their goods online. While the farm's products were initially sold via the owners' social circle, the reputation of its products grew, leading to increased demand. This increase in demand is primarily an illustration of strong market orientation and the in-depth understanding of market processes of the owners of the farm. This deep understanding was once again illustrated when the owners decided to streamline distribution and broaden the client base by creating an online shop. This initial investment has slowly grown into a much broader online system connecting trade and logistics into a joint system. Furthermore, the online system is now being employed by other enterprises that sell organic products, allowing the online shop to broaden the scope of products sold,

satisfy the expectations of a larger group of clients and reduce the costs of logistics.

6. THE CHALLENGES OF IMPLEMENTATION OF DIGITAL TOOLS

In the following sections, the article will discuss how the barriers proposed by Ferrari *et al.* (2022) played out in practice.

6.1. Socio-cultural barriers

The three cases, while representing different approaches to introducing digital tools, illustrate similar motivations to explore the opportunities provided by digital tools. Specifically, the motivation was rooted in the scarcity of local clients and the need to find a more efficient way to attract more affluent customers living in the capital of Latvia. Demographic processes such as (peri)urbanisation and income disparity between urban and rural areas forced the rural entrepreneurs (in this case – farmers producing high-quality beef) to search for markets outside of their immediate surroundings and focus on potential customers in cities.

The depopulation of rural areas in Latvia has had several side effects, including higher per capita costs for new infrastructure projects and the loss of potential consumers in direct proximity. Digital means are perceived as a promising option to deal with some of these issues. The envisioned result of the three cases was an online solution (a mix of ideas incorporating online shops, Facebook groups, interlinked databases, etc.) that would enable all participants to reach out to potential customers, convince consumers that the products are of high quality, and allow farmers to commercially benefit from the newfound segment of buyers. The farmers involved already had a group of clients buying their products. However, digital solutions offered the possibility to broaden the customer base, increase the predictability of trade and a possibility to rethink the pricing of the products sold.

However, the solutions imagined by the initiatives required collaboration. Only the third case (the enterprise) decided to work alone – initially, just one farm was involved in developing the system. This case also was the only one among the three that managed to build a successful platform. The first and second cases involved negotiations between the different parties involved, and this ended up illuminating the internal challenges that these initiatives had to tackle. On the one hand, the two groups had to ensure that there was

trust between the participants. On the other hand, they needed to secure trust in the system they were building.

The challenges rooted in a lack of mutual trust can be illustrated with an example from the case of the cooperative. Joint engagement with clients was linked to the idea of joint planning – pulling clients into one database and distributing them geographically was expected to improve the efficiency of logistics and processing. To make the system work, farmers needed to mobilise their existing customers to use the system – they needed to demonstrate their trust in the system (and the endeavour as a whole) by submitting the contact information of their clients for entry into a centralised database. However, the farmers involved chose not to do this. Insufficient mutual trust and lack of trust in the digital solution being developed turned out to be a substantial barrier. This hampered the group's ability to benefit from already existing resources present in the group. While the group as a whole supported the new solution in principle, many of the members were not ready to commit to it with their client base. It should be mentioned that insufficient mutual trust and willingness to cooperate was also evident in the case of the Group. This hampered the farmers' ability to reach an agreement on minor, yet key aspects needed to start to work on a more practical solution.

However, it was also apparent that stakeholders did not seem to be closed-minded or suspicious of digital tools in general. Instead, most of the farmers involved in our examples could be described as having a broadly pragmatic and open-minded outlook when engaging in the debate, especially as regards their business. This is attested by the fact that many of them were already experimenting with various digital tools (e.g. using communication tools, farm management systems, benefiting from databases maintained by the state, introducing sophisticated trading system to sell animals in auctions to customers from abroad etc.), some of which required shifting away from their typical practices. As one farmer explained – she felt she was too old to fully benefit from new communication tools and social media, and thus she felt that she was not sufficiently in touch with her clients. To counter this, she hired a part-time specialist who oversaw her communication channels. This illustrates that for at least some of these farmers entrepreneurialism and the need to make decisions that benefit their business outweigh discomfort with new technologies and new practices. However, failure to establish trust gave rise to anxiety and implicit suspicion. In the case of the cooperative, because farmers did not fully trust the introduced solutions or the group of farmers they were working with, they did not fully commit to

the developed database. They feared that by committing to it they would lose their clients.

Cooperation (or lack thereof) is also relevant when thinking about competencies. Although competencies can be a barrier to implementation, evidence from all three cases illustrates that farmers who are looking for a way to benefit from digital tools are open to attracting support and assistance to facilitate the implementation of digital solutions and maintain them in the long term. In addition, the cases reveal widespread access to formal and informal consultations on technical issues related to these tools. For instance, the cooperative reveals how the networks of contacts within the cooperative are used to support the initial attempts to resolve technical issues with their tool – the initial system they built was mainly managed by friends and relatives who had the necessary knowledge. However, even though access to technical skills was not, in principle, an issue, understanding what exactly the farmers needed was, and this problem was dealt with differently in each of the three cases. In the case of the cooperative, the lack of clarity about what is necessary led to several unnecessary functions initially being envisioned for the tool; in the case of the group, it precluded farmers from agreeing on what to do; in the case of the enterprise, a professional was brought in to overcome the challenge.

The difficulty in identifying what solution would work best for these groups is strongly linked to another barrier – the complexity of non-digital issues farmers have to resolve. In the cases of the cooperative and the enterprise, work on the online system eventually led to a conversation about various other solutions the farmers have implemented or might have to implement, such as those related to logistics, common pricing, distribution, and common standards for various pieces of the meat they plan to sell together. While some of these issues were relatively simple to resolve, other issues – such as common pricing and joint standards – had been longstanding and had thus far been ignored. Now, however, the farmers had to address these questions and find a solution. The enterprise managed to avoid the socio-organisational challenges by building the initial solution on its own not consulting with other farmers.

6.2. Technical barriers

From the technological perspective, the three cases were relatively simple. Two of the three cases eventually developed an online shop (the cooperative and the enterprise). Meanwhile, the third (the group), despite countless ideas, never actually fully decided on what could be a workable solution. It also needs to be stressed that

none of these cases was ever fully confident in where the borders of their needs lie and thus the perspective of what exactly the initiative represents changed during its development. Consequently, issues of various complexity requiring different skill sets and different technological facilities were encountered by the actors.

Connectivity can be an issue in rural areas and a noteworthy barrier to introducing new technological solutions. However, none of the solutions that are considered in these cases reported any issues related to access (to the internet) and connectivity that precluded the intended solutions from being implemented. Some of the solutions may have required constant access to high-speed internet. One of the solutions considered by the group and the cooperative – to have a live stream from the farm allowing potential customers to follow the daily life on the farm and the wellbeing of the cows in real time – required a stable internet connection. Likewise, the solution developed in the enterprise where the online shop exchanges information with the storehouse, thus constantly following the availability of products offered in the shop, also required a stable connection.

Nonetheless, the cooperative developed an online shop that does not presuppose a stable high-speed internet connection. Instead, the developed homepage is stored on the servers and all orders clients make are stored in a database located on the same server. The responsible person for advancing the project must access the database to review the orders and communicate them to the farmers. This solution does not require a fast internet connection. Thus, delays in processing the orders and can result in selling products that are no longer in stock. However, due to the relatively small scope of the operation, the group of farmers have not yet encountered any substantial problems with the solution. Consequently, for these cases, connectivity does not appear to be a limitation.

Due to the relative simplicity of the solutions under consideration, it is also not relevant to discuss the dependability of technologies. However, there might be a reason to discuss dependability in the context of trust. Trust in technology derives from trust in its ability to deliver the promised result. As has been suggested already, while the farmers were generally open to technological solutions, they were sometimes hesitant towards becoming completely reliant upon them. In the case of the enterprise, this was resolved organisationally – farmers choosing to sell their products to the online shop could still maintain their existing sales channels. Meanwhile, in the case of the cooperative farmers were expected to make the shift and sell their products via the online shop, thus demonstrating their trust in the

technology and the cooperative. However, this is the step that created difficulties for the cooperative, as noted above. Furthermore, while the initiatives are working towards similar goals, they are very different. Usability is one of the dimensions where these differences are most clearly visible. For the cooperative, the solution has been arrived at via a process of trial and error. The cooperative eventually decided to go with a simple system that takes orders and can be easily maintained by people with limited IT proficiency. Although it has been described as an online shop – in reality, it would be more accurate to call it an ordering system where one expresses interest in the product, rather than buys it. Furthermore, instead of building it from the ground up, the coop decided to buy an already functional web page that was then adapted to the needs of the cooperative. Thus, it could be suggested, that the cooperative has not been affected by the potential challenges related to the technology – it just downgraded its expectations whenever it faced challenges. However, on the other hand, there are also questions regarding the relevance of the final system – has it managed to reduce the time farmers spend on engaging with clients and has it managed to attract additional clients? The challenges associated with the technical side of the online ordering system have encouraged the cooperative to abandon other additional functionalities initially envisioned for the website.

The group never introduced any specific solutions. In fact, it never got so far as to identify the best solution. In many ways, this was because the group was unable to agree on a solution that would benefit all the actors involved and could be equally efficiently introduced by all (due to differences in skills and technological facilities available). Thus, usability was a barrier in this case, and it even precluded the idea from “getting off the ground”.

The enterprise chose a different approach – as the actor working to develop the online shop recognised that their knowledge was insufficient to build the necessary tool, they decided to hire an expert who could take care of this part. This may have been a more expensive decision, but it allowed the representatives of the farm to implement their original vision of what they wanted. This decision was perceived as an investment. Running the online shop gradually provided the farm with a practical understanding of how different systems can be linked together. Thus, the farm was able to build a much more complex system than its counterparts.

This leads to the final potential barrier related to the scalability of the solutions adopted, but it should be noted that none of the cases we have been looking at had a plan regarding the possibilities of increasing the scale of

operation or of adding additional layers to the developed solution that would require better connectivity.

6.3. Economic barriers

The implementation of digital solutions is also directly linked to economic considerations. The possibility of engaging with longstanding challenges was the key motivation for the cases to consider the potential of digital tools. On the other hand, the actors trying to introduce new solutions had to consider the trade-offs, challenges and expenses associated with setting up and maintaining these new solutions. Costs are a significant barrier the cases had to overcome. All the solutions the cases were pursuing came with at least some investments at different stages of implementation. It is also worth noting that the cases illustrate that the notion of costs is not as straightforward as it might seem, and the actors looking to implement new solutions have the means to control the level of investments needed to implement the tools. Two of the cases considered in this article (the cooperative and the enterprise) that managed to implement a version of an online shop in their daily operations illustrate different strategies for dealing with costs. Actors looking for a way to implement a digital solution can look for a cheaper solution with the same functionality, or they might decide to cut the functionality of the chosen instrument. They have also the option to determine the balance between the work done internally and the work outsourced to professionals. The choices actors make in this regard are dependent on the competencies available in the organisation and the envisioned link between the challenges the organisation faces and the expectations it has towards the solution it is working with.

The cooperative offers an interesting insight into the trade-offs an actor has to consider. The farmers involved in the cooperative aimed at developing a system that would support trade and eventually allow them to integrate their activities and operate via this joint online platform. To achieve this, the cooperative initiated work towards several goals – creating joint logistical solutions (which meant both developing a logistics database and developing a solution for delivering the products), looking for joint processing facilities, implementing a joint marketing approach (organising shared off-line and on-line campaigns and maintaining shared profiles in social media) and designing an online shop. Initially, the vision was to integrate these different elements under the umbrella of the online shop. However, the partners could not agree on how to do it and lacked the expertise to make informed decisions in these areas. Furthermore, partners struggled to find common ground on how to

resolve the issues they had encountered. Consequently, after the initial attempt to develop a joint logistical solution, this idea was shelved. The joint processing initiative suffered a similar fate – despite some internal disagreements, the cooperative was officially working with one slaughterhouse. It was expected that this solution would help to maintain the same standards for all pieces of meat sold by the cooperative and to improve planning. Still, some partners continued to use other services, thus contributing to mistrust among the members. Ultimately this meant that the cooperative had to focus on the online shop and online marketing. In both cases the cooperative mainly relied upon the internal capacity that has allowed it to technically achieve its goals yet has in general created obsolete solutions (as described previously) that will most likely fail to deliver the expected results. Partly this was because the initial budget of the investment shrunk as some of the farmers decided not to contribute.

Meanwhile, the enterprise decided to approach the challenge (development of the online shop and later – the supporting databases) from a different angle – it engaged professionals at all stages. This appears to be the reason why it ended up with a much more functional system that is more sensitive towards farmers' and consumers' needs. Instead of relying on internal experience, the enterprise decided to consult professionals. This, presumably, allowed them to identify potential pitfalls earlier.

The debate on the costs of these solutions can also be used as a starting point to address another barrier associated with economic performance – the scale of the adopted solution. It has been suggested that the size of rural businesses limits their potential income from any digital solution. This in turn leads to a situation where there are both few incentives as well as little funding to ensure that the digital solutions are properly maintained and adapted to the needs of rural businesses. This appears to be an issue for the cases considered in this article. However, a better explanation of why exactly this is an issue can be provided if the two relevant cases are considered.

In the first case, the idea was that a group of farmers working together could allocate resources to implement digital solutions. However, with time it became apparent that not all farmers were equally interested in developing the online shop and other envisioned solutions and, consequently, less than half of the initial group were willing to engage with the project. Consequently, any future costs had to be covered by a much smaller group of stakeholders. Furthermore, since the end result has issues, it is plausible that more farmers may be looking to leave the endeavour, potentially even withdrawing funding from the project. On the other hand, the case

of the enterprise engaged with the challenge differently – it gradually attracted new enterprises that could make use of the online shop to sell artisanal organic products. This means that more actors became invested in maintaining the online platform, while simultaneously increasing the potential client base by providing a greater range of products.

6.4. Regulatory-institutional barriers

The final set of barriers to consider is linked to policies. None of the cases considered in the article has been pushing the boundaries of what is legal and what is illegal. The actors involved were not primarily interested in discussing issues related to how digital space is regulated. These questions are not among their priorities. Still, some issues that are regulated in real life cause consequences that shape the activities these groups are engaging in online.

The first potential barrier for the cases concerns data management and more particularly the protection of personal data. The question of data protection has many layers in this context. Farmers trading directly with consumers tend to store clients' contact information, yet few of them do this in a secure way or take the time to reflect on how the gathered data should be stored. Many of them have been using simple communication tools such as WhatsApp, email and others to reach out to their customers. The cooperative originally had an idea to develop an area on its homepage available only to registered users. The idea was temporarily dropped due to a shortage of funds as it became apparent that the idea was too expensive, and it could not be introduced solely relying on the skills of friends and relatives. Thus, somebody had to be hired to develop the area. Still, the idea has not been dropped and it could still be implemented sometime in the future. However, if the function were to be introduced, it would require storing much more data and consequently would require a more thorough approach to data management from the cooperative. So far, however, these issues have not been given much thought by the cooperative. With this being said, it is also worth noting that the stakeholders engaged in these activities are not ignorant of issues related to data protection. There were occasions when farmers expressed their concerns related to data management thus illustrating that they recognised the issue. For example, one of the participants from the second case raised several issues related to real-time video streaming during one of the discussions – what videos can be streamed, what would be the safety requirements for the stream, whether are there any limitations regarding who can access the

stream, etc. Thus, there is awareness among the actors of data-related regulatory challenges. Yet it seems, that so far these questions have been regarded as hypothetical questions rather than real issues.

None of the cases assessed in this article were looking to develop something radically innovative. Instead, they were reintroducing solutions that were already well-known across various sectors and countries. The same could be said about the broader transition process in agriculture – most farmers looking for new digital solutions are working within the boundaries of innovation that have been tested and are based on numerous well-documented examples that have been implemented in various sectors. On the one hand, because of this, one could argue that the initiatives have information regarding the potential pitfalls and challenges they might face. On the other hand, and this is even more important, organisations and groups are in a place that can support farmers' attempts to introduce the attempts to change. For example, the farmer who raised the issue related to video streaming explained that the issue was explained to her by a professional organisation she represents. Later on, the same organisation helped her to identify potential solutions. Thus, a network of support groups and professional organisations along with a subsidised network of consultants that allows farmers to access consultations either free of charge or for a relatively small fee ensures that the information is available in various forms and those that are interested can easily access it. However, this does not remove the need for investments that are necessary to introduce proper data management practices.

Other specific regulations that were referenced by the participants did not concern digitalisation as such. Rather, the concrete examples of pertinent legislation concerned wider processes in rural development and agriculture that prevented the farmers involved in the cases from fully implementing their vision. For example, it was indicated that the support given to cooperatives is calculated based on the cooperatives' turnover in the previous year. This limited the immediate possibilities of the first case to attract funds and thus hampered its ability to make immediate joint investments in the system it was developing. This was one of the reasons why the initiative had to make gradual investments and rely on internal competencies that, as has been shown earlier, limited the functionality of the online tool. Another example is the restrictions imposed on slaughtering animals. However, again, these only have an indirect effect on the use of digital tools by creating challenges for developing joint logistical solutions.

7. DISCUSSION AND CONCLUSIONS

The different ways in which the three cases engage with new digital tools illustrate that there are multiple methods of dealing with barriers. In fact, as with many other issues related to rural development and agriculture, initiatives must find creative ways of dealing with the challenges they encounter and be open to improvising and ready to make smart use of the resources they have. This allows them to find strategies for dealing with potential challenges.

It also appears that knowledge and skills are available to people looking to benefit from digital technologies – actors trying to introduce digital tools can reach out to commercial providers offering insights on how to benefit from digital tools. However, they can also look for the skills needed in their own social networks or advisory services. There might be differences in the quality of the advice obtained, but this issue should be approached on a case-by-case basis, as digital competencies do not necessarily entail formal certification, especially if they have been obtained through practice.

What seems to be the real challenge for the actors is understanding the best way to benefit from these tools. Not just in the sense of building a set of individual instruments but developing a system that works well together and can be integrated with existing practices and routines, and deliver the expected results. However, at least two of the three cases struggled to build a system and did not have a coherent understanding of how different functions could be tied together and integrated with how the farmers generally approach their business. Consequently, the real challenge might not be to make the digital tool operational but to ensure that entrepreneurs properly integrate them into the way they think about their enterprise and then critically assess what the tool in question can deliver and what is needed for the tool to be able to deliver the expected benefits.

In addition, in the first and second cases, the main challenges that were tackled with digital tools were not, in fact, related to digitalisation but illuminated the unresolved issues farmers had in other areas, such as difficulties collaborating, agreeing on common goals or challenges agreeing on farming practices. Digital solutions would not be able to resolve these challenges. These social issues would likely have to be dealt with first, before introducing digital fixes.

It is also clear from the overview of the cases, that not all digital tools can be perceived as similar when it comes to implementation. The cases considered here were focused on marketing and the article has illustrated that to benefit from the tools one needs a clear grasp of

the links tying their business and consumers and what it is that consumers are actually buying from them.

REFERENCES

- Adão R., Beraja M., Pandalai-Nayar N. (2022). *Fast and Slow Technological Transitions*.
- Barrett C.B., Benton T.G., Cooper K.A., Fanzo J., Gandhi R., Herrero M., James S., Kahn M., Mason-D'Croz D., Mathys A., Nelson R.J., Shen J., Thornton P., Bageant E., Fan S., Mude A.G., Sibanda L.M., Wood S. (2020). Bundling innovations to transform agri-food systems. *Nature Sustainability*, 3: 974-976. DOI: <https://doi.org/10.1038/s41893-020-00661-8>
- Bronson K. (2019). Looking through a responsible innovation lens at uneven engagements with digital farming. *NJAS - Wageningen Journal of Life Sciences*, 90-91, 100294. DOI: <https://doi.org/10.1016/j.njas.2019.03.001>
- Central Statistical Bureau of Latvia. (2019). *Internet usage at households continues to increase* [Press release].
- DESI (2022). *Digital economy and society index (DESI) 2022*. Latvia.
- Dufva T., Dufva M. (2019). Grasping the future of the digital society. *Futures*, 107: 17-28. DOI: <https://doi.org/10.1016/j.futures.2018.11.001>
- European Commission (2018a). *EU funds broadband access for underserved households in rural Latvia*.
- European Commission (2018b). *Shaping the digital (r)evolution in agriculture*.
- Ferrari A., Bacco M., Gaber K., Jedlitschek A., Hess S., Keipainen J., Koltsida P., Toli E., Brunori G. (2022). Drivers, barriers and impacts of digitalisation in rural areas from the viewpoint of experts. *Information and Software Technology*. 145, 106816. DOI: <https://doi.org/10.1016/j.infsof.2021.106816>
- Fielke S., Taylor B., Jakku E. (2020). Digitalisation of agricultural knowledge and advice networks: A state-of-the-art review. *Agricultural Systems*. 180, 102763. DOI: <https://doi.org/10.1016/j.agsy.2019.102763>
- Klerkx L., Rose D. (2020). Dealing with the game-changing technologies of Agriculture 4.0: How do we manage diversity and responsibility in food system transition pathways? *Global Food Security*. 24, 100347. DOI: <https://doi.org/10.1016/j.gfs.2019.100347>
- Kobos P.H., Malczynski L.A., Walker L.T.N., Borns D.J., Klis G.T. (2018). Timing is everything: A technology transition framework for regulatory and market readiness levels. *Technological Forecasting & Social Change*. 137: 211-225. DOI: <https://doi.org/10.1016/j.techfore.2018.07.052>
- OECD (2021). *Going Digital in Latvia*. DOI: <https://doi.org/10.1787/8eec1828-en>.
- Rijswijk K., de Vries J.R., Klerkx L., Turner J.A. (2023). The enabling and constraining connections between trust and digitalisation in incumbent value chains. *Technological Forecasting & Social Change*, 286. DOI: <https://doi.org/10.1016/j.techfore.2022.122175>.
- Schneider S., Kokshagina O. (2018). Digital transformation: What we have learned (thus far) and what is next. *Creat Innov Manag*, 30: 384-411. DOI: <https://doi.org/10.1111/caim.12414>
- VARAM (2020). *Digitālās transformācijas pamatnostādnes 2021-2027*. Gadam (*Digital Transformation Guidelines for 2021-2027*).
- Zhao G., Liu S., Lopez C., Lu H., Elgueta S., Chen H., Boshkoska B.M. (2019). Blockchain technology in agri-food value chain management: A synthesis of applications, challenges and future research directions. *Computers and Industry*. 109: 83-99. DOI: <https://doi.org/10.1016/j.compind.2019.04.002>