# 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 incomes 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 scenarios 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. 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 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. 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. 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 hand.

Two barriers are hindering the take-up of digitalisation in the region, therefore two research questions have been formulated around these two problems:

- **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.

In the second scenario, we assume that precision technology will remain costly, thus small-scale producers will not be able to reap its benefits. 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.

## POLICY IMPLICATIONS

**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 and easing 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.

**Helping generation change in agriculture**

- Policy should support generational change by legal measures.
- Policy should support generational change with more digitalisation oriented national and EU funds.

**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.

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DESIRA POLICY BRIEF