



DIGITISATION: ECONOMIC AND SOCIAL IMPACTS IN RURAL AREAS

# NATIONAL POLICY ANALYSIS

## HUNGARY

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## National Policy Analysis | Hungary

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## Executive Summary

Hungary's approach to digitalisation has undergone significant development in the last decade. Especially since 2015, decision-makers have recognised that the current digital age places significant expectations on all sectors, including industry and agriculture. The process of digitalisation has also been facilitated by the European Union's complex and comprehensive digitalisation initiatives. In order to respond to the challenges of digitalisation, Hungary has established an extremely comprehensive and cross-cutting digitalisation strategy, in line with the objectives of the European Union. Hungary's National Digitisation Strategy 2021-2030 was announced in June 2020 and its aim is to improve the digital infrastructure, digital skills, digital economy and digital state of the country.

This report focuses on Hungary, especially the North Great Plain region. The North Great Plain region encompasses three counties at the eastern border of Hungary, located next to Romania. Despite the fact that the territory of the country is quite small, there are significant economic and social disparities between the western and eastern parts of Hungary. For example, the regional gross domestic product was only 47% of the EU average in 2020<sup>1</sup> (PPS per inhabitant in % of the EU27 2020 average), while the same number was 71% for the most western region (West Transdanubia). These differences were reflected in the current level of digitalisation of the region and the challenges ahead. Agriculture is a key sector in the region, which is of key importance in increasing the economic development of the region and maintaining the rural way of life. However, agriculture must respond to growing global market competition and environmental challenges.

Hungary has recognised the challenges of digitalisation and has developed detailed and comprehensive strategies in response. These strategies cover all segments of the economy and society, but are focused primarily on the digitalisation of industry and agriculture and the improvement of digital literacy among the population. Nevertheless, the lack of digitalisation is still high in agriculture and especially in rural areas. A significant proportion of the rural society's digital skills do not meet today's labour market expectations and retraining the population will require outside support. Several strategies started only after 2016 or later, thus there is no information on their effectiveness yet. Promising initiatives have been launched, but especially in the case of agriculture, the objectives can only be achieved through adequate knowledge transfer and financial support and close coordination with market and academy stakeholders. Future digitalisation initiatives may benefit from developing a common, accessible and expanding knowledge base and adapting good practices.

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<sup>1</sup> Source: <https://ec.europa.eu/eurostat/databrowser/view/tgs00006/default/table?lang=en>

## 1. Introduction

Rural areas have major importance in Hungarian economic and social development. The rural territory of Hungary covers more than 92 thousand km<sup>2</sup>, and makes up more than 99% of the country's total area (ENRD, 2015); therefore, Hungary is often considered a rural country, where the only highly urbanised area is the capital city (Budapest) and its agglomeration. The country has seven NUTS level regions, of which the North Great Plain region is the easternmost. The territory of the North Great Plain is more than 17.7 thousand km<sup>2</sup>, which is 19% of the total area of the country. The region's permanent population (1.49 million) makes up 15% of the total population. According to the Regional Economic Accounts for agriculture, the gross value added in the region by agricultural holdings engaged in agricultural activity was 297 billion HUF, which was 25.5% of the total in 2019 (latest data). The net entrepreneurial income was 206 billion HUF, almost one third of the total amount. The number of permanent employees was 26.5 thousand, which was the highest value among the seven regions (and was 23% of the national value of 114 thousand)<sup>2</sup>. The region is located in a highly drought-prone area with high temperature fluctuations and frequent ice damage, all of which significantly affect the quantity and quality of agricultural crops. The region makes an important contribution to the agricultural output of the country, but it is not taking advantage of the opportunities offered by digitalisation. Furthermore, a low proportion of farmers have the relevant higher education necessary for agriculture, and individual practices often rely on experience and tradition. Thus, efficient implementation of digitalisation policies may contribute to the economic and social development of the region.

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 the proportion of users remains below 30%. The use of digital devices in all age groups is mainly related to banking, in addition to the use of electronic documents and general office software, but the proportion of these items also decreases with advancing age. The use of precision instruments is critically low in Hungary. The most commonly used tool is the crop condition survey, but only 5.3% of farms made use of such tools (of which only 3.1% did so with their own equipment and 3.2% with leased equipment). The use of guided/automatic steering, differentiated work operations and general environmental sensors is also widespread, but the proportion does not reach 4%. Surprisingly, out of 163.7 thousand farmers, more than 123 thousand farmers do not use these tools because they think they do not need them, while 22 thousand do not have the necessary knowledge. Only 18.4 thousand farmers said that the technology was expensive, that the tools of 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. By age, it can be seen that young farmers cited the high price of technology as the second most important reason, while older farmers tended to lack up-to-date knowledge. The development of technology used in agriculture can not only increase the efficiency of production and, as a result, the level of profit that can be realised in agriculture, but also reduce the environmental impact of agricultural production, which contributes to sustainability in the long run<sup>3</sup>.

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<sup>2</sup> Source: <https://statinfo.ksh.hu/Statinfo/haViewer.jsp?lang=en>

<sup>3</sup> Source: [https://www.ksh.hu/docs/hun/xftp/ac2020/elozetes\\_adatok/index.html#/agrardigitalizacio](https://www.ksh.hu/docs/hun/xftp/ac2020/elozetes_adatok/index.html#/agrardigitalizacio)

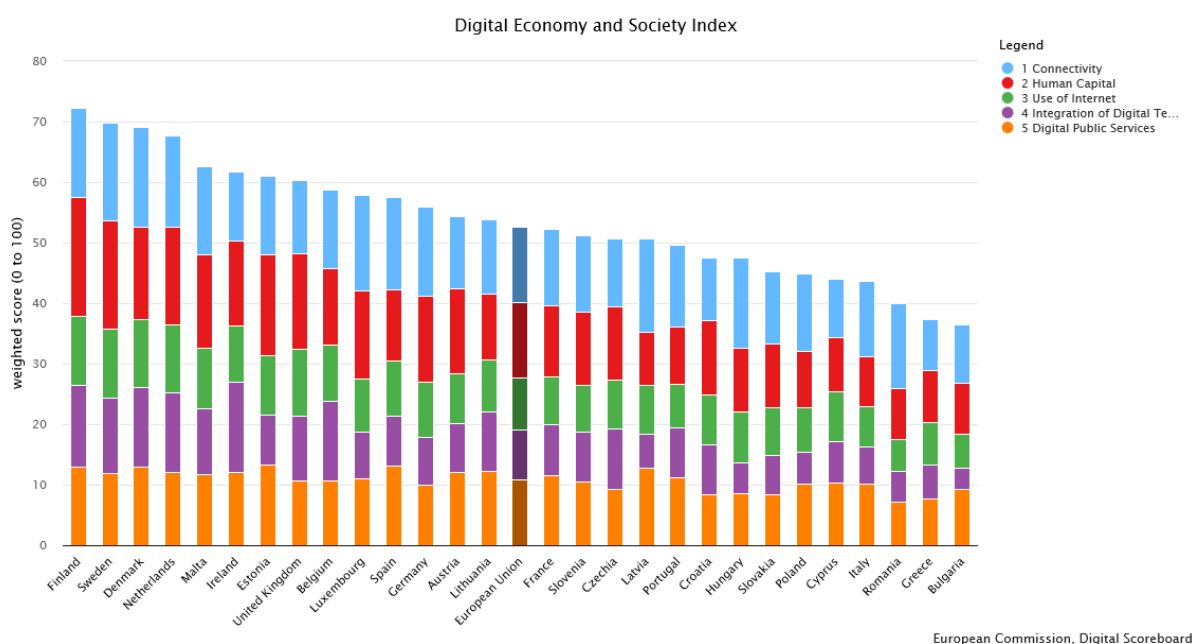
Digitalisation efforts in Hungary have undergone significant development since 2016, and major areas, such as education, workforce, agriculture, industry and exports, among others, have received their own digitalisation strategies. These strategies have been supported by various other initiatives aimed at facilitating the digitalisation of small and medium-sized enterprises and increasing their competitiveness. The primary goal in these strategies was to increase the collective knowledge base, transfer good practice and support businesses in the digitalisation process. These programs are strongly intertwined, as part of an umbrella program. The objectives set by these strategies were overambitious in some cases, and can only be achieved through collective cooperation and long-term financial support. However, the strategies correctly identified the critical areas for digitalisation and developed a mutually reinforcing mechanism. Particular attention was paid to industry-specific objectives, in particular support for small and medium-sized enterprises (SMEs).

## 2. Context for (rural) digitalisation

### 2.1. Current context for digitalisation

Hungary’s territory is predominantly rural with a great contrast between the eastern and northern regions and the capital city, Budapest. There are several areas seriously lagging behind in terms of digitalisation. However, it should also be pointed out that we do not have accessible data in many areas, so it is difficult to assess the state of digitisation within the country. Nevertheless, fragmentation in the state of digitisation is recognizable. There is a particularly large difference between the region in and around the capital and other areas. Rural areas are rather characterised by the emergence of knowledge centres (such as agriculture or the automotive industry), but these tend to be concentrated in a few areas, while the capital city and its agglomeration is well connected to the knowledge network of digitalisation.

In terms of the Digital Economy and Society Index (DESI), Hungary lags behind the EU average, and ranks 21<sup>st</sup> among the Member States (with a DESI score of 47.5). Its position is slightly better compared to 2019, by one position and with a 13% increase (while the EU average score has increased by 6.5%). The Member States with similar values most often had similar historical and cultural backgrounds, for example Slovakia or Poland. Among the components, Connectivity accounted for 14.9%, Human Capital accounted for 10.5%, Use of the Internet for 8.38%, Integration of Digital Technology for 5.06% and Digital Public Services for 8.67% (Figure 1). Hungary ranks highest on (broadband) Connectivity, and is positioned among the leader Member States in in the take-up of at least 100 Mbps broadband, 5G readiness and in Overall fixed broadband take-up. At the same time, over half of the population lacks basic digital skills and software skills (European Commission, 2020f).

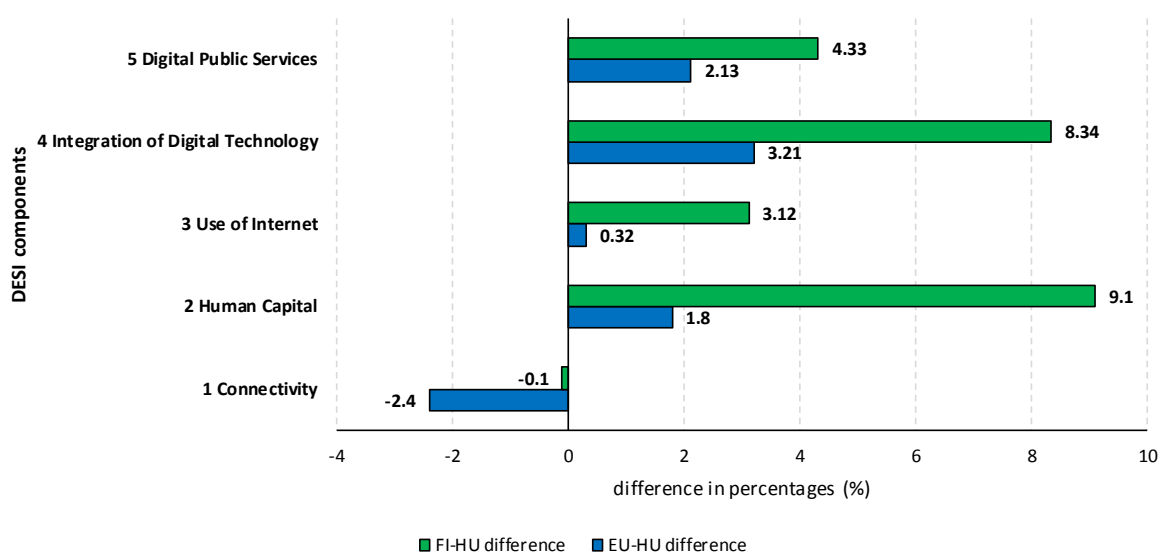


**Figure 1: Digital Economy and Society Index (DESI) in 2020**

Source: European Commission (2020e)



In terms of differences, Hungary has a relatively favourable index proportion of the first component (1 Connectivity) compared to the EU average and to Finland (FI), which ranked first in 2020. In the remaining four categories, the differences between the Hungarian and the EU are between 0 and 5%, while the differences are between 3-9% in case of Finland. The first component is the weighted average of the five sub-dimensions: 1a Fixed Broadband take-up (25%), 1b Fixed broadband coverage (25%), 1c Mobile broadband (35%) and 1d Broadband price index (15%). The Human Capital Dimension is calculated as the weighted average of the two sub-dimensions: 2a Internet User Skills (50%) and 2b Advanced Skills and Development (50%), which implies that Hungary has great room for improvement in terms of skills related to digitalisation. This was an expected outcome, which can be seen in the food industry as well, and further supports the focal questions (Figure 2).

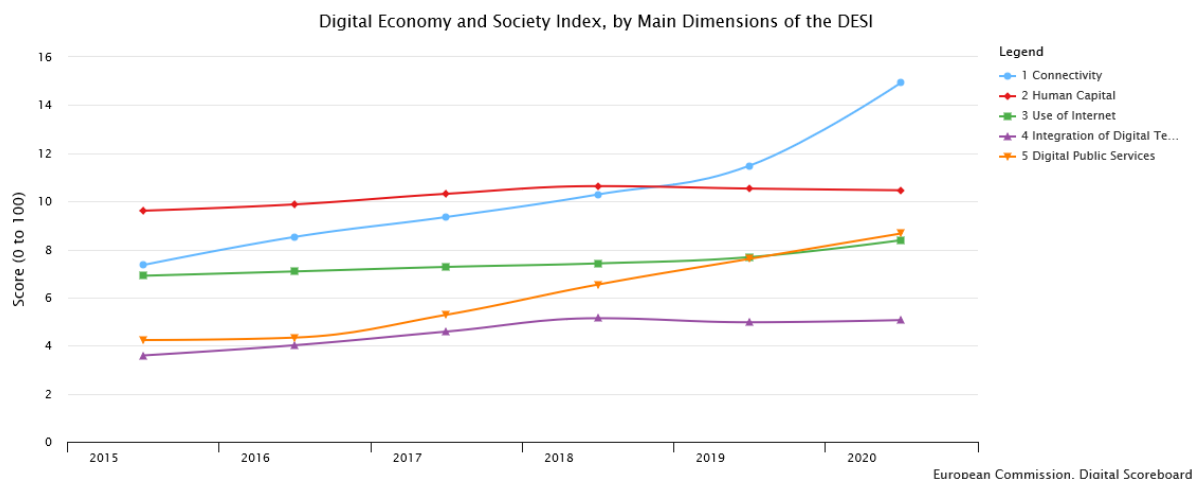


**Figure 2: Differences in the DESI composite index between Finland and Hungary, and the EU and Hungary in 2020 (%)**

Source: Based on European Commission (2020e)

By looking at the development of the individual components, 1 Connectivity showed the greatest increase (from 7.35 to 14.9), especially in the last sample year (Figure 3). The increase in Connectivity could be attributed to several factors, notably due to the significant number of infrastructure development programs. For example, in addition to investments at the national level, special attention was paid to the development of educational infrastructure as well. A similar, although less pronounced increase could be seen in the case of 5 Digital Public Services (from 4.23 to 8.67), due to significant government efforts to improve these services. A moderate increase was observed in the case of Use of the Internet (from 6.9 to 8.38). Although 2 Human Capital and 4 Integration of Digital Technology have increased as well (from scores of 9.61 and 3.59 to 10.5 and 5.06, respectively), the value of the index had declined since 2018 in both cases. Integration of Digital Technology is still one of the main areas which lags behind, since enterprises perform poorly on most technology indicators in Hungary (European Commission, 2021a). Interestingly, the 2 Human Capital score has stagnated in case of the EU average as well, but the individual components have shown continuous growth (Figure 3). Increased growth in Human Capital type measurements is expected in the future, since the policy

framework to upgrade digital skills is ambitious. It is broadly defined, as it covers both the development of the basic skills of citizens and the supply of IT professionals (European Commission, 2021a).



**Figure 3: The development of the main dimensions of the DESI index between 2015 and 2020**

Source: European Commission (2020c)

In the survey there were large differences in terms of components in the case of Hungary. According to the first indicator, 1 Connectivity, Hungary ranked in the 7<sup>th</sup> position, ahead of Germany, Finland and Belgium, for example. According to indicator 2, Human Capital, the situation was much more unfavourable, as Hungary ranked in 19<sup>th</sup> place. Furthermore, Hungary ranked 14<sup>th</sup> in the case of 3 Use of Internet Services, 26<sup>th</sup> for 4 Integration of Digital Technology (which was almost the last position) and 24<sup>th</sup> for 5 Digital Public Services. The unfavourable position in the case of Integration of Digital Technology was due to the fact that many companies were not exploiting the digital technology opportunities, such as cloud computing and big data, and few of them sell online (European Commission, 2020f).

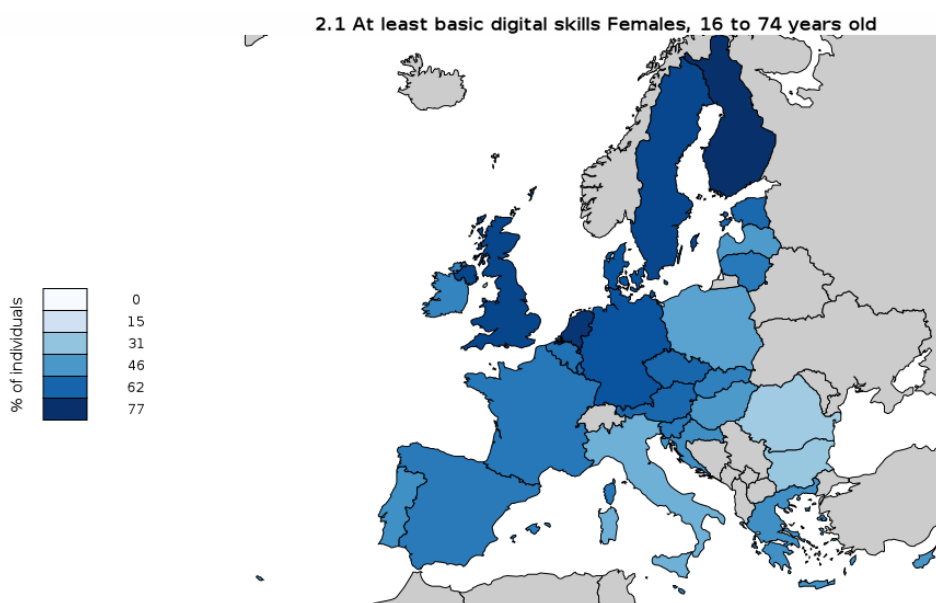
According to the Network Readiness Index (NRI) (Portulans Institute, 2020), Hungary ranks 39<sup>th</sup> out of the total 134 economies included in the NRI 2020 with a score of 60.05. In its overall conclusion, it is very similar to the DESI index. Hungary's main strength is the *Technology* pillar, while the *People* pillar had the greatest scope for improvement. Hungary had a score below the income group average in each of the four pillars. At the sub-pillar level, Hungary outperforms high-income countries in terms of Access and Regulation out of the twelve sub-pillars. Access, Regulation and SDG Contribution showed a good performance in Hungary, where it outperformed the average in Europe (of twelve sub-pillars). Hungary performed particularly well in terms of Internet access in schools, e-commerce legislation, and the ICT regulatory environment. By contrast, the economy's weakest indicators included Investment in emerging technologies, Prevalence of the gig economy, and Rural gap in the use of digital payments (Portulans Institute, 2020). There were large differences in terms of ranks by sub-pillar as well, *Access*, *Regulation* and *SDG Contribution* occupied the 1<sup>st</sup>, 1<sup>st</sup> and 2<sup>nd</sup> places respectively, while *Investment in emerging technologies*, *Prevalence of gig economy*, and *Rural gap in use of digital payments* came 100<sup>th</sup>, 98<sup>th</sup> and 88<sup>th</sup> (Table I).

**Table 1: Scores for Hungary vs. averages of its income group and region, overall and by pillar**

Dimension	Hungary	High-income countries	Europe
<b>NRI</b>	60.05	66.82	64.21
<b>Technology</b>	56.43	62.51	59.93
<b>People</b>	51.81	62.72	59.89
<b>Governance</b>	70.16	75.41	72.98
<b>Impact</b>	61.79	66.63	64.04

Source: Based on Portulans Institute (2020)

Gender comparison is a critical area, since in most cases, women are in a less favourable position in terms of digitalisation. We choose to illustrate the European situation with the indicator “At least basic digital skills” among women aged between 16 and 74. In Hungary, 46% of women had at least basic digital skills in 2020, while the same proportion in the EU was 56%. This puts Hungary 23<sup>rd</sup> among the Member States. At the same time, there was a higher proportion of men with above basic digital skills and at least basic software skills (European Commission, 2020h). Compared to other EU Member States, Hungary’s ranking was unfavourable, especially compared to the northern Member States. For example, in Finland, almost 80% of women had at least basic digital skills, while in Sweden this figure was 71%, in the Netherlands 76.2%, and in the UK, 71.2%. The neighbouring countries (except Romania) had proportions ranging from 49 to 62% (Figure 4).

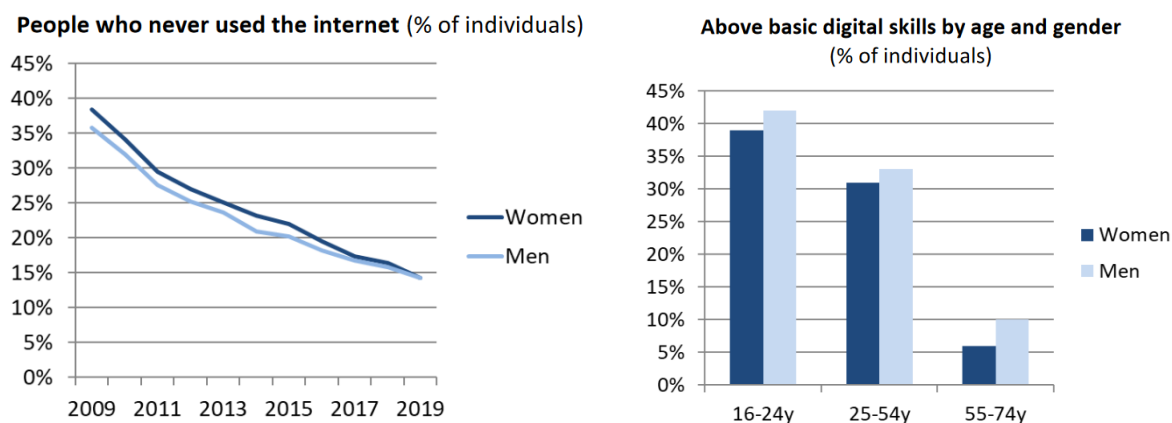


**Figure 4: The proportion of women with at least basic digital skills in 2020 in Europe**

Note: People with at least basic digital skills in each of the following four dimensions: information, communication, problem solving, software for content creation. People possessing, at a minimum, the skills required to perform activities such as using e-mail, editing tools, installing new devices, etc.

Source: European Commission (2019a)

Since 2009, there has been a steady decline in the proportion of individuals who have never used the Internet, which is due to the fact that an increasing number of people have access to it in Hungary. The proportion of women who have never used the Internet was slightly higher at the start, but the difference between men and women diminished over time. In almost all cases, women were in a less favourable position in terms of digitalisation. This could be observed by looking at the age distribution as well. In every age group, men represented a higher proportion of those individuals whose digital skills have exceeded the basics (Figure 5).

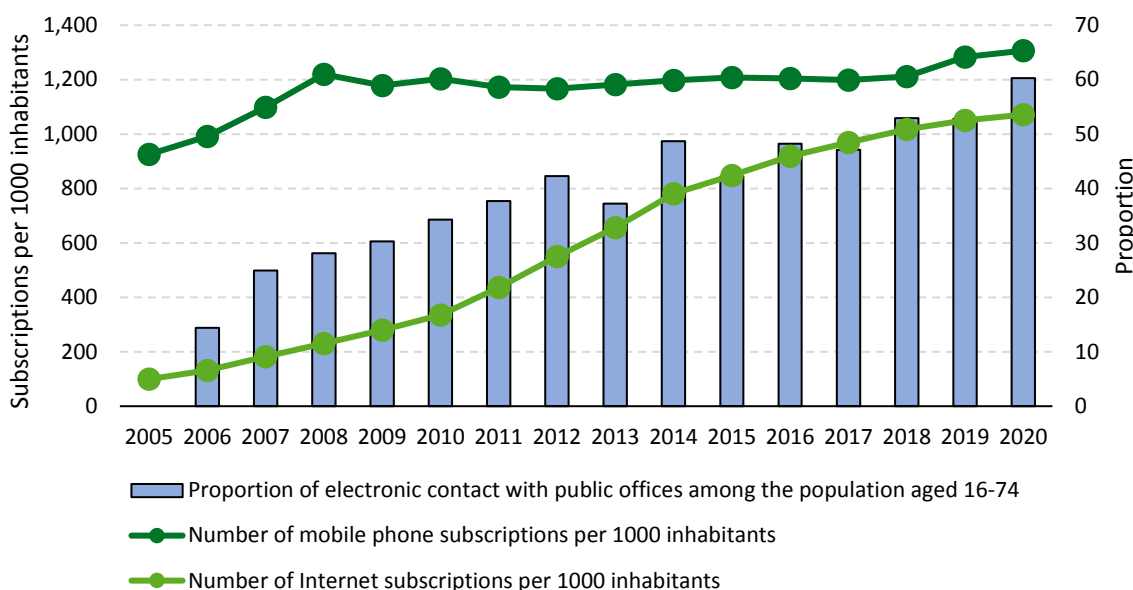


**Figure 5: The proportion of people who have never used the Internet, and those with above basic digital skills by age and gender in Hungary, 2020**

Source: European Commission (2020h)

The overall Women in Digital Index was 41.5, lower than the EU average of 54.5 in 2020. In 2020, there were only 7.8 STEM graduates per 1000 individuals aged 20-29, compared to the EU average of 14.3. Around 0.8% of those in total employment were female ICT specialists, while the EU average was twice as high. Finally, the unadjusted gender pay gap reached a 20% difference in pay, slightly higher than the EU average of 18% (European Commission, 2020h). However, 4.3% of graduates had studied ICT, which exceeded the EU average of 3.6%. The government has launched initiatives to improve the situation, such as the TechGirls (organised by the German-Hungarian Chamber of Commerce and Industry), and the Girls' Day (organised by the Association of Hungarian Women in Science). Both target 14-18 year-olds with the aim of helping women in ICT (European Commission, 2020f).

Since the EU accession, the general development in information and communication technology has been strong in Hungary. The average number of mobile phone subscriptions per 1000 inhabitants was around 925 in 2005, which has increased to more than 1300 in 2020. There was an even greater growth in terms of the number of internet subscriptions per 1000 inhabitants. In 2005, only 99 internet subscriptions were recorded for 1000 persons, which increased tenfold to 1071 in 2020. At the same time, a larger proportion of the population aged 16-74 came into electronic contact with public offices, increasing from almost 15% to more than 60% between 2005 and 2020. While there is still room for improvement, the general tendency of development was clearly visible after 2005 (Figure 6).

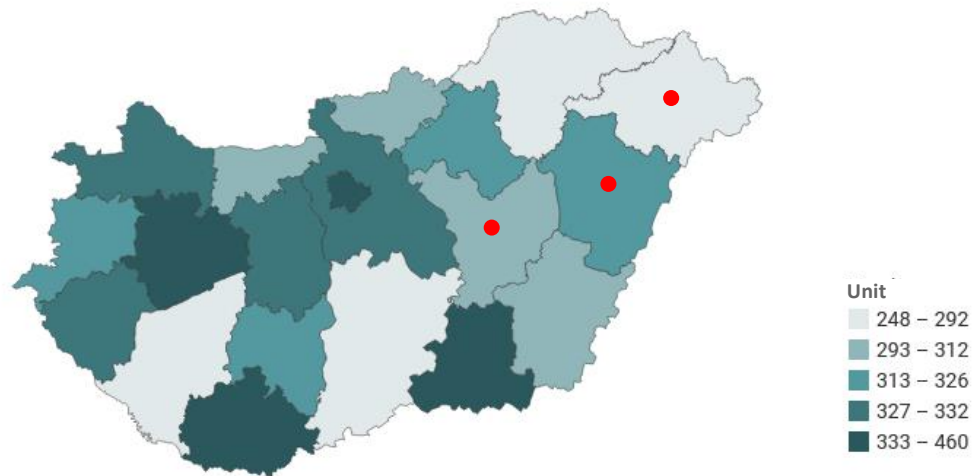


**Figure 6: The main indicators of information and communication in Hungary**

Source: Based on KSH (2020a)

In terms of company data, almost all companies had an internet connection (94%), while 63% of them owned a website (the EU average was higher, around 77%). The services available on the businesses’ website were mainly product and service information (81%), but the proportion of social media contacts (38%) and online ordering information (28%) was also high (out of the 63% who had a website). Only 13% of the companies used their own website or web application for sales, while 3% accounted for sales through the electronic marketplaces. Only 1.5% of Hungarian enterprises use a chatbot, a virtual assistant service based on artificial intelligence technology, although the EU average was also only 2.0%. In 2020, 25% of businesses purchased a cloud-based service. The EU average was 36% and Hungary lagged behind the leading EU Member States, such as Finland (75%), Sweden (70%), Denmark (67%), Italy (59%) and Estonia (56%). Furthermore, nearly 13% of domestic manufacturing companies have already used an industrial robot. The “Internet of Things, IoT” was used by 18% of businesses in the EU on average, while in Hungary this figure was 14% (KSH, 2020b).

The information available about digitalisation was very limited at the regional level. The national average subscription was 338 per thousand capita. It was highest in Budapest (458) and lowest in the northern county of the North Great Plain region (Szabolcs-Szatmár-Bereg, 248). There was a large heterogeneity within the region, with the average number of subscriptions varying between 248 and 314 per thousand. In generally, large discrepancies could be observed between the western and eastern parts of the country (Figure 7).

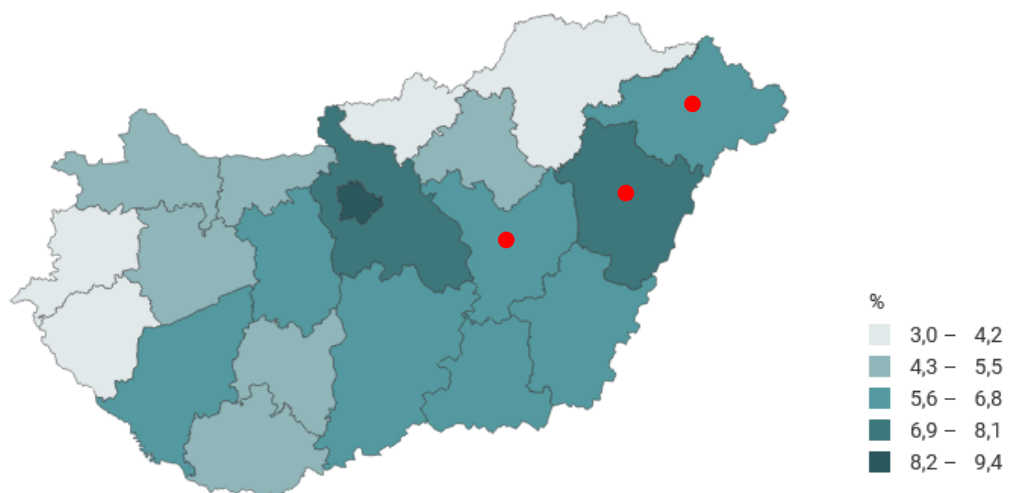


**Figure 7: Number of fixed Internet subscriptions per thousand inhabitants by county in 2020**

Note: The red dots denote the counties of the North Great Plain region.

Source: KSH (2020b)

In Hungary, most companies using fixed broadband Internet had download speeds between 30 and 100 Mbit/s in 2020 (24% and 30%, respectively), in line with the EU numbers. About one-fifth of companies have download speeds between 100 and 500 Mbit/s. The proportion of download speeds above 100 Mbit/s was highest in Denmark (75%), Sweden (69%), and Belgium (68%), while in Hungary it was only 36%. The proportion was the highest in Budapest (9%) domestically, and the two counties with the highest rate were Pest (7.7%) and Hajdú-Bihar (7.4%). The latter is the central county in the North Great Plain region. Overall, the regional proportion was between 6.3 and 7.4% (Figure 8).



**Figure 8: Proportion of enterprises with an Internet download speed of at least 1 Gbit/s, by county in 2020**

Note: The red dots denote the counties of the North Great Plain region.

Source: KSH (2020b)

Overall, in almost all cases, a discrepancy could be observed in the general level of digitalisation between the western and the eastern parts of the country.

## 2.2. Current context for agricultural digitalisation in Hungary

In this section, the situation of the agricultural and food industry of Hungary is briefly presented, especially the areas related to digitalisation. This section builds on the results of the 2020 Agricultural Census carried out by the Hungarian Central Statistical Office (HCSO – Központi Statisztikai Hivatal, KSH) and the study by Gaál, Humenyik, Illés, and Kiss (2020), which covered the Farm Accountancy Data Network (FADN) in Hungary.

According to the KSH (2021), agriculture has been characterised by an increase in concentration over the past decade in Hungary. The number of farms was 234 000 in 2020, down two-thirds since 2010. Concentration processes were exacerbated by the increase in land per farm, for example from 18 hectares in 2010 to 26.7 hectares in 2020 for arable land. A typical activity was crop production, the proportion of which has been growing steadily over the last decade and reached 67% of total farms in 2020. Of the more than 4.8 million hectares of agricultural land, 82% was arable land. Around 41% of the arable land was cultivated by farms with more than 300 hectares of land and farms with a land area of between 5 and 300 hectares cultivated 55% of the agricultural area. In the orchard, lawn and vineyard categories, the latter size category of farm cultivated 60-75% of the areas as well. The proportion of land used by farmers aged between 14 and 39 was only 10-15% in 2020. In addition, the proportion of self-owned land increased for farmers with more than 300 hectares, but decreased for smaller farms. Managers between the ages of 40 and 64 with higher agricultural qualifications ran larger farms. With age, the proportion of self-owned areas increased as well. About 51% of livestock were managed by farms where the manager was between the ages of 40 and 64 with at least a secondary agricultural education. A higher proportion of managers of livestock farms have a specialised qualification: 32% have at least a secondary agricultural education compared to 19% of managers of crop farms. However, a significant proportion of farm managers have only practical experience, which was between 49-62% depending on the type of production. The proportion of managers with tertiary education was only 4-11%. While the proportion of workers with tertiary education was only 5% in 2020 for farms with a production value of less than € 4,000, reaching 60% for farms with a production value of more than € 500,000 (KSH, 2021).

Digitalisation was not common for Hungarian farmers. Farmers used computers mainly for banking and electronic document management, but the proportion remains below 30%. The use of digital devices in all age groups was mainly related to banking, in addition to the use of electronic documents and general office software, but the proportion of these also decreased with advancing age. The use of precision instruments was critically low in the agricultural sector of Hungary. The most commonly used tool was the crop condition survey, but it also accounted for only 5.3% of farms (of which only 3.1% did so with their own equipment and 3.2% with leased equipment). The use of guided / automatic steering, differentiated work operations and general environmental sensors was also widespread, but their proportion did not reach 4%. Surprisingly, more than 123 thousand of the 163.7 thousand farmers did not use these tools because they did not think they were necessary, while 22

thousand farmers did not have the necessary knowledge. Only 18.4 thousand farmers said that the technology was expensive, that the tools on 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 reason, while older farmers tended to have no current knowledge (KSH, 2021). Although precision farming has been present in Hungary for more than a decade and a half, it is still an unknown concept for many people (Ministry for Innovation and Technology, 2019). Despite the fact that producers acknowledge both the advantages and disadvantages of precision farming, the increased uptake of these technologies is still to come. Around 1-5% of farmers, depending on the technology under study, have tools suitable for precision farming, but do not use them. Of those who do not currently use any of the technologies studied, around 70% still have no plans to introduce them. The planned investments related to digitalisation had low investment value (typically less than HUF 500,000 or EUR 1400-1600, which is sufficient for the purchase of sensors and accessories at most), but this was also dependent on the size of the economy. The 31-40 age group was at the forefront of digital competences and investment in digitisation. According to this study, the main factor hindering the spread of precision farming was the additional cost of the investment, the fact that it did not fit the size of the farm and the lack of adequate funding and the lack of expertise to apply it (Gaál et al., 2020).

### 3. Policy framework for (rural) digitalisation

The Hungarian government, industry associations and academy stakeholders have launched a number of initiatives since 2016, having recognised the challenges and the changing economy in the EU. Hungary has also developed an overall umbrella program for digitalisation, beside several strategies and action plans. The overall number of digitalisation strategies and areas covered indicate that digitalisation is an important priority in Hungary. There is a real demand from the industry to engage in digital transformation, which can be seen from the proactive approach of stakeholders outside the government (European Commission, 2019b). The Hungarian political framework seems to focus strongly on Hungary's disadvantages, but it follows EU proposals in all cases and national and EU-level policies are closely aligned.

#### 3.1. National Policies

##### 3.1.1. National Digital Agenda / strategies

**Table II.** summarises briefly the national policies with the objectives and the expected impact. These strategies were interrelated and wide-ranging, thus objectives and impacts have often been summarised and simplified in the table.



**Table II: National Policies**

Ministry / Authority	Policy	Objective	Expected Impact
<b>Ministry of Innovation &amp; Technology</b>	National Digitisation Strategy 2021-2030	1) 95% of households covered by gigabit networks, 2) less than 2% of those in the 16-70 age group without digital skills, 3) more than 30% of processes in enterprises are digitalised, 4) 90 % of inhabitants use e-government services.	Hungary's digital development will exceed the EU average by the middle of the decade, and by 2030 it will be among the ten leading EU economies.
<b>Ministry of Innovation &amp; Technology</b>	Irinyi plan	Use of new and digital technologies, energy and material efficiency and smart and economic use of land according to local assets, reduction in territorial disparities, support to the sectors that (also) use electricity during the low off-peak period and encouragement of material efficient manufacturing.	Move to an innovation-driven economy, with industry relying on knowledge, research and development, higher education, and vocational training, while strengthening the industry's competitiveness.
<b>Ministry of Innovation &amp; Technology /Ministry of National Economy</b>	Industry 4.0 Development Strategy	Help industry stakeholders with regards to Industry 4.0 as a catalyser.	Industry 4.0 National Technology Platform to support an Internet-based economy and innovation by stepping into a new era of technology.
<b>Ministry of Innovation &amp; Technology /Ministry of National Economy</b>	DWP - Digital Workforce Program	Improve digital skills and digital literacy.	Alleviate the shortage of IT and digitally trained professionals.
<b>Ministry of Innovation &amp; Technology</b>	DEFS - Digital Healthcare Development Strategy	Digitalisation of healthcare by reducing the workload of healthcare professionals, creating quality patient care and new jobs.	Improved well-being and health status of Hungarian citizens.
<b>Ministry of Innovation &amp; Technology</b>	DAS - Digital Agriculture Strategy of Hungary	To improve the situation of agriculture and the food industry by collecting and processing information, automating and robotising technology	Its vision is extremely broad, but it includes the widespread and efficient use of agricultural IT systems, the development of adequate human competence, the development of advisory and operator background, the improvement of farmers'

		operations, contributing to increasing the profitability of the food economy, including agricultural production, while making efficient use of available environmental resources.	incomes and the situation in the countryside, while reducing the environmental impact of agriculture.
<b>Ministry of Innovation &amp; Technology</b>	Digital Success Capital Programme	Supporting innovative digital developments that strengthen the competitiveness of businesses.	Companies effectively involved in the digital ecosystem.
<b>Ministry of Innovation &amp; Technology</b>	Artificial Intelligence Coalition	Strengthen the competitiveness of domestic enterprises due to the widespread use and application of AI-based developments, start-ups and SME participation in AI development, fair, regulated and efficient utilisation of data assets.	Aims to put Hungary at the forefront of artificial intelligence developments and applications in Europe and to become an important member of the international AI community.
<b>Hungarian Chamber of Commerce and Industry</b>	Modern Enterprises Programme	Reduction of the primary (digital illiteracy) and secondary (low degree of utilisation) digital divide, enabling micro and small enterprises to recognise business opportunities resulting from the introduction of ICT systems and to make use of those opportunities, making available the benefits of the digital ecosystem to those lagging behind more lasting (e-inclusion).	The development of digital competences of micro, small and medium-sized enterprises in Hungary.
<b>National Research, Development and Innovation Office/ Ministry of Innovation &amp; Technology</b>	National Smart Specialisation Strategy (S3)	To build an internationally competitive RDI system based on national strengths by embracing territorial specificities.	Strengthened socio-economic position in the period 2021-2027, with strengthened domestic SMEs.

Source: Authors' own collection based on the relevant strategy documents

The **National Digitisation Strategy 2021-2030 (NDS)** by the Ministry for Innovation and Technology (2020b) corresponds to a comprehensive framework strategy, which builds on the integrated National

Infocommunication Strategy (2014-2020), on the EU strategy documents, on the DESI index and also takes the initiatives of the Digital Success Programme (DSP) into account. It has 4 main pillars:

- 1) digital infrastructure
- 2) digital skills,
- 3) digital economy and
- 4) digital state (Ministry for Innovation and Technology, 2020b).

The NDS covers a wide range of indicators and measurements to form the specific aims of the national strategy, such as:

- the availability of wired and wireless digital infrastructure with adequate service capability and quality,
- continuous development of the digital competence and media awareness of the population and employees' digital skills,
- increasing the digital preparedness of enterprises, the integration of digital technology, encouraging the spread of innovative digital solutions,
- expanding the range of customer-friendly digital public services available and strengthening openness and motivation to use them among citizens and businesses, establishing cross-border service provision in the areas expected by the EU, furthermore, the support of these measures (Ministry for Innovation and Technology, 2020b).

The National Digitisation Strategy 2021-2030 (NDS) is the backbone of the Hungarian digitalisation policies. The NDS indicator system is largely the same as the DESI measurement system, with specific targets for some key indicators set by 2030. This implies a strong connection with the European digitalisation policies. According to the strategy, in addition to the direct tasks of the state, the involvement of the state is recommended only where it is absolutely justified. The use of regulatory and even more fiscal tools (tax relief, domestic and / or EU subsidies, direct state involvement, etc.) is justified only in those cases where the identified market failure or bottleneck would not otherwise be treated (or only in the distant future) (Ministry for Innovation and Technology, 2020b).

According to Regulation 2012/2015. (XII. 29.) of the Hungarian Government, all infocommunication programmes should be coordinated through the Digital Success Programme. The **DSP - Digital Success Programme 1.0** (Digitális Jólét Program, DJP) was launched in 2015 by the Hungarian Government with strategies devised for different sectors, such as the Digital Education Strategy of Hungary, the Digital Export Development Strategy of Hungary, the Digital Startup Strategy of Hungary and the Digital Child Protection Strategy of Hungary. In 2017, the **Digital Success Programme 2.0** was implemented, based on the results of the National Infocommunication Strategy after broad consultations with the professional community and the general public. This led to the Digital Success Programme 2030 (2019-2020) as a holistic system for government strategies related to the development of Hungary's digital ecosystem (Digital Success Program, 2017). Digitalisation is a priority area that has also been highlighted in the long-term food strategy of the Hungarian food economy (Ministry of Agriculture, 2017). Companies in the food industry lag behind in terms of digitalisation, mostly due to the large number of micro companies in the industry (Ministry for Innovation and

Technology, 2020b). The economic benefits of the current digitalisation level of the domestic agricultural sector are currently untapped. Existing developments are island-like, resulting in significant data loss and data degradation. Most companies have "intelligence" tools as standard, but they only provide productivity gains with adequate integration (Digital Success Program, 2017).

An important part of these programs was the budget allocated. The overall funding of initiatives and support mechanisms is estimated to be around 262.38 million EUR. The Digital Success Programme with the Coordination Centres and selected mentors is supporting Pillar 5 of the Digitising European Industry initiative (DEI). For Pillar 5, it is estimated that a minimum of 17,373,622 EUR EU funding (ERDF) is allocated. The Industry 4.0 Development Strategy launched in 2016 has a direct budget of 4.6 million EUR to support SMEs with 12.3 million EUR allocated to increase capacity. The Industry 4.0 National Technology Platform is financed from membership fees. The umbrella program of the Digital Success Program is funded from EU funds (ERDF and ESF), loan and venture capital programs and tax cuts. The Irinyi Plan which aimed to digitalise the industry was financed from EU (ERDF and ESF) and national funds. The Modern Enterprises' Programme has an allocated budget of 18.8 million EUR, split between EU and national funding (European Commission, 2019b).

The European Commission (2019b) created a SWOT analysis on digitalisation in Hungary, which can be summarised as follows:

- The main **strengths** of digitalisation in Hungary are the strong entrepreneurial culture among citizens, the favourable investment climate with low taxes and easy access to loans, the government and industry involvement in initiatives and finally, the industry stakeholders' high interest in digitalisation.
- The main **weaknesses** includes the lack of realisation of business potential among Hungarian SME's and the low level of understanding of initiatives, the lack of ICT professionals, and the weak management skills of SMEs. Furthermore, weak language skills act as a barrier as well.
- Increasing the value of investments and access to finance culture can be viewed as an **opportunity**, along with the supportive tax policy, and the cooperation between government, academy and industry (and among V4 countries).
- However, the out-of-date regulatory framework, the fragmented innovation system, the widening digital skill gap and the lack resources (EU and national budget) can be viewed as a **threat** to digitalisation.

Hungary's remaining digitalisation strategies cover a broad range of areas; for example, **The Digital Child Protection Strategy of Hungary, The Digital Export Development Strategy of Hungary, The Digital Education Strategy of Hungary and the Digital Startup Strategy of Hungary**. The overall digitalisation is supported by indirect measures as well, such as tax policy to stimulate the economy, and policies designed for micro and small enterprises to simplify the tax system and to cut administrative burdens. From 2020 July 1, pension contributions, health contributions and labour market contributions will be merged into a single contribution. Several other measures were introduced to reduce administrative and tax burdens, to support employment and even to boost the population (Government of Hungary, 2020).

Agriculture and the food industry received special attention in the programme. The **Digital Agriculture Strategy of Hungary (DAS)** issued by the Ministry for Innovation and Technology (2019) argues - based on the Ministry of Agriculture (2017) calculations - that the Hungarian food economy has a 60% higher production potential compared to its current level. Furthermore, due to its importance in the Hungarian economy and rural areas, the Hungarian Government declared the food processing sector a strategic sector (Ministry for Innovation and Technology, 2016c). One possible way to unlock this potential is by applying the Agricultural 4.0 conception and increasing the level of digitalisation. The DAS highlights the following areas, where adaptation and improvement are required:

- Production supporting systems
- Company - level production management systems
- Systems that support product path integration supporting systems
- Professional background systems
- Administrative background systems (Digital Success Program, 2017).

Its main objective is to improve the situation of agriculture and the food industry by collecting and processing information, automating and robotising technology operations, contributing to increasing the profitability of the food economy, including agricultural production, while making efficient use of available environmental resources. The DAS laid down three strategic and four horizontal goals.

The three strategic goals were the following:

**1) Agricultural production**

- Wider application of precision farming (S1)

**2) Agricultural holding**

- Use of plant management applications in farm management, decision making (S2)

**3) Product path**

- Development of product tracking systems and online business (S3)

**Horizontal objectives were the following:**

**1) Human resources**

- Development of the digital competence of agricultural economic actors (H1.1)
- Making digital agricultural advice available to producers (H1.2)

**2) Research, development, innovation**

- Development of the digital agro-innovation environment (H2.1)
- Development of a digital agricultural start-up “ecosystem” (H2.2)

**3) Administrative and public services**

- Reducing the cost of access to public data and digital services (H3.1)
- Legal deregulation for exploiting the potential of digital technology (H3.2)

- Improving the collection and processing of sectoral data (H3.3)

#### 4) Development policy, subsidies

- Supporting the spread of precision farming (H4.1)

The implementation of the DAS is expected to start in 2021. The estimated funding will be 55 billion HUF (more than 155-170 million EUR, based on the reference exchange rate of the annual average provided by the ECB, 2019 = 325.30 Hungarian forint/Euro, 2020 = 351.25 Hungarian forint/Euro<sup>4</sup>). In addition, the Government provides targeted subsidies to promote the spread of digitalisation in agriculture (Government of Hungary, 2020).

On the social side, the **DWP - Digital Workforce Program** is a comprehensive programme designed to increase the overall digital skills of the population. The task of the Digital Workforce Program is to address the growing demand and ensure an increase in the number of professionals with a high level of digital knowledge, especially with regard to the demand for digital labour in Hungarian small businesses. It is also necessary to achieve a general increase in the digital competence of citizens and SMEs. New methodological foundations need to be established, while the needs of industry and training need to be aligned. The number and output of other vocational training schemes based on the use of IT solutions must be significantly increased, and the digital content of training needs to be reviewed and supplemented in vocational education, higher education and adult education. Significant capacity building of traditional training systems is necessary, while developing new training possibilities. Finally, the program should increase application motivation and career orientation (Ministry for National Economy, 2018).

Our focal questions are supported by the DAS - Digital Agriculture Strategy of Hungary, mostly on the technical side, and by the DWP - Digital Workforce Program on the social side, but obviously, these strategies are highly interconnected and reinforce each other's aims (in line with other strategies, for example, the Digital Export Development Strategy of Hungary). At the same time, other programs, like the Industry 4.0 help to achieve these goals directly.

Hungary continued the **Modern Enterprises Programme**, which is managed by the Hungarian Chamber of Commerce and Industry. The Program focuses on the development of the digital competences of micro, small and medium-sized enterprises in Hungary and provides businesses with non-financial services and free services in rural areas. The aim is to help them to join the digital economy and increase their competitiveness (European Commission, 2020f) According to Interreg Europe (2021), the program has 4 main pillars:

- 1) Free audit and advertising
- 2) Qualified suppliers, products and service database
- 3) Information events about how to join
- 4) A library, as a digital knowledge portal for digital businesses.

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<sup>4</sup> Source: [https://sdw.ecb.europa.eu/quickview.do?SERIES\\_KEY=120.EXR.A.HUF.EUR.SP00.A](https://sdw.ecb.europa.eu/quickview.do?SERIES_KEY=120.EXR.A.HUF.EUR.SP00.A)

So far, more than 22,000 businesses have joined the program, resulting in more than 3,000 discounted products. Nearly 500 events and more than 15,000 IT and business audits have been conducted under the program. The amount of the contracted support is HUF 6.4 billion and the planned completion date of the project is 31 March 2022<sup>5</sup>.

Finally, it is worth mentioning, that Hungary launched the **National Laboratories Programme** in 2020, which aims to bring together research institutions, universities and industry in a given research field. It is expected that it will boost future-oriented technologies that could be used by domestic research organisations<sup>6</sup>.

### 3.2. Contributions from the Structural and Investment Funds and the Cohesion Policy

The EU Cohesion Policy makes a major contribution to making Europe fit for the digital age. The focus of these digital investments in Europe is *“to overcome the digital divide both socially, economically and geographically, by reaping the benefits of digitisation for citizens, companies and governments so that no EU region is left behind”*.<sup>7</sup> We used the European Commission’s project website (link: [https://ec.europa.eu/regional\\_policy/en/projects](https://ec.europa.eu/regional_policy/en/projects)), to collect projects in Hungary, founded through the Cohesion Policy in the 2014-2020 period. Since most of the projects were of an infrastructural nature (such as road construction and public transport infrastructure), we only focused on those related to digitalisation:

- **Extreme Light Infrastructure (ELI) project**

A cross-border scientific collaboration (Czech Republic, Romania and Hungary involved) to use new and emerging laser technology. Total investment for the project “Attosecond Light Pulse Source (ALPS) of the Extreme Light Infrastructure in Hungary Phase 2” is 256 300 522 EUR, with the EU’s European Regional Development Fund contributing 113 481 285 EUR.

- **Improving the sustainability of urban mobility in Central Europe**

It aim is to establish sustainable urban mobility systems that reduce air pollution and improve quality of life. The projects used many of the concepts related to digitalisation, for example the open data policies. Total investment for the project “Low Carb: Capacity Building For Integrated Low-Carbon Mobility Planning In Functional Urban Areas” is 2 636 268 EUR, with the EU’s European Regional Development Fund contributing 2 177 697 EUR. LOW-CARB had reduced CO2 emissions by almost 60 thousand tons by 2020 in the Central European Region<sup>8</sup>

- **InnoHPC project turned to high-performance computing**

The project aims to provide all industry access to the transformative power of High-performance computing (HPC). Total investment for the project “High-Performance

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<sup>5</sup> Source: [https://vallalkozzdigitalisan.hu/a\\_projektrol.html](https://vallalkozzdigitalisan.hu/a_projektrol.html)

<sup>6</sup> Source: <https://nkfih.gov.hu/for-the-applicants/innovation-ecosystem/national-laboratories-programme>

<sup>7</sup> Source : [https://ec.europa.eu/regional\\_policy/hu/policy/how/priorities/digital-age](https://ec.europa.eu/regional_policy/hu/policy/how/priorities/digital-age)

<sup>8</sup> Source: <https://www.interreg-central.eu/Content.Node/LOW-CARB.html>

Computing for Effective Innovation in the Danube Region (InnoHPC)” is 2 054 600 EUR, with the EU’s European Regional Development Fund and Instrument for Pre-Accession contributing 1 746 410 EUR.

- **Developing a surgical planning system for treating degenerative joint diseases in Northern Hungary**

Total investment for the project "Personalised Restorative Implants with Navigation for a Healthy Society" is 3 104 182 EUR with the EU’s European Regional Development Fund contributing 2 638 555 EUR.

- **Installation of a 20 MW photovoltaic power plant in Northern Hungary**

The new plant received an investment from the EU’s Cohesion Fund. It is located on a 45 hectare site in the northern district of Felsőzsolca (a Hungarian town). The power produced meets the yearly electricity consumption of about 8 000 households, which means around 18 000 residents<sup>9</sup>.

- **New equipment for a Hungarian telecommunications equipment supplier**

Total investment for the project “Competitiveness increase with adaptive technological innovation at Kommtech International Communication Technical Ltd” is 113 021 EUR, with the EU’s European Regional Development Fund contributing 45 148 EUR. Since 2018, the system has been used at over 100 events globally; furthermore, it was used to help two of Budapest’s hospitals during COVID-19<sup>10</sup>.

- **The TechTown project**

The project aimed to explore how the job creation potential of the digital economy for 11 European small- and medium-sized cities could be maximised. Total investment for the project TechTown is 749 000 EUR, with the EU’s European Regional Development Fund contributing 585 237 EUR.

- **Energy@School project**

An awareness-raising approach for schools. Total investment for the project “Energy optimisation and behaviour change into schools of Central Europe” is 2 581 379 EUR, with the EU’s European Regional Development Fund contributing 2 127 776 EUR.

- **The ERUDITE project**

Regional partnerships of Finland, France, Hungary, Ireland, Italy, Slovenia and Sweden that have extended high-speed broadband and digital services to rural and urban areas. Total investment for the project “ERUDITE – Enhancing Rural and Urban Digital Innovation Territories” is 2 075 178 EUR, with the EU’s European Regional Development Fund contributing 1 737 632 EUR.

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<sup>9</sup> Source: [https://ec.europa.eu/regional\\_policy/en/projects/Hungary/new-solar-power-plant-delivers-clean-energy-in-hungary](https://ec.europa.eu/regional_policy/en/projects/Hungary/new-solar-power-plant-delivers-clean-energy-in-hungary)

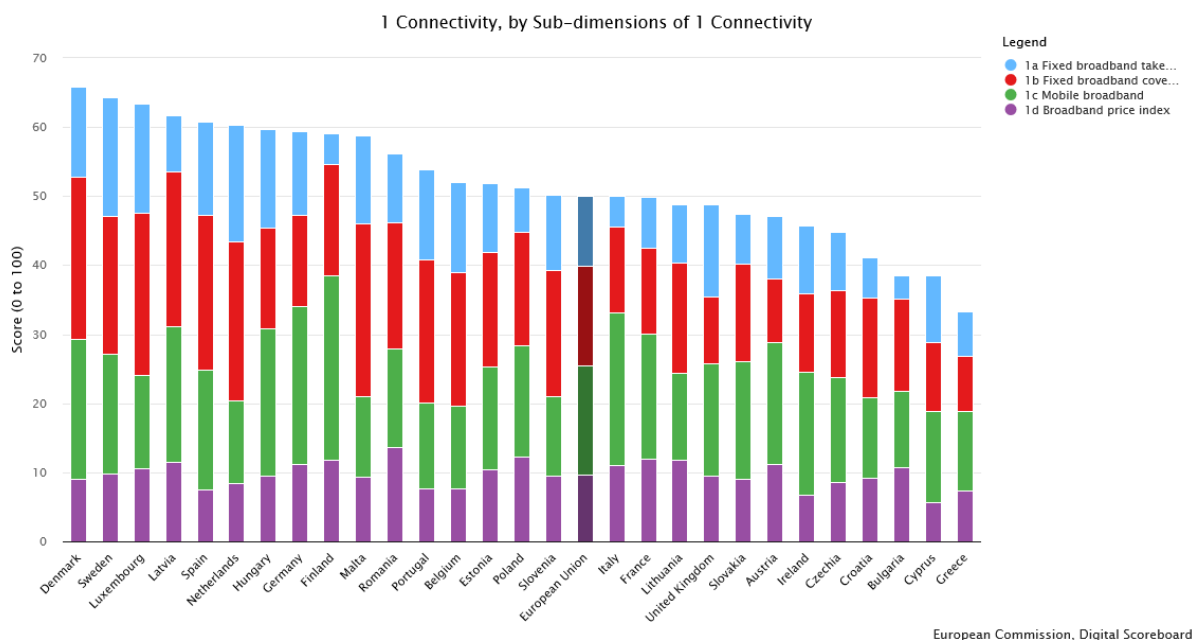
<sup>10</sup> Source: [https://ec.europa.eu/regional\\_policy/en/projects/Hungary/hungarian-telecoms-equipment-supplier-makes-its-voice-heard-thanks-to-eu-funding](https://ec.europa.eu/regional_policy/en/projects/Hungary/hungarian-telecoms-equipment-supplier-makes-its-voice-heard-thanks-to-eu-funding)



As can be seen, the projects to be implemented between 2014 and 2020 also covered major areas of digitisation, in particular infrastructure development, asset acquisition and digital competence development.

### 3.2.1. Broadband infrastructure

In terms of broadband infrastructure, Hungary can be regarded as a leading Member State in the EU. Hungary ranked 7<sup>th</sup> in 2020 in terms of Connectivity. This was due to the relatively well-developed broadband infrastructure (Figure 9). Broadband internet access would be a key to improving the rural areas and fostering rural innovation. Despite the overall Connectivity score, the European Commission (2020a) notes that coverage in rural areas was lower and the digital skills of the population were among the worst. This makes the elderly, inactive, unemployed, less educated people digitally more vulnerable.



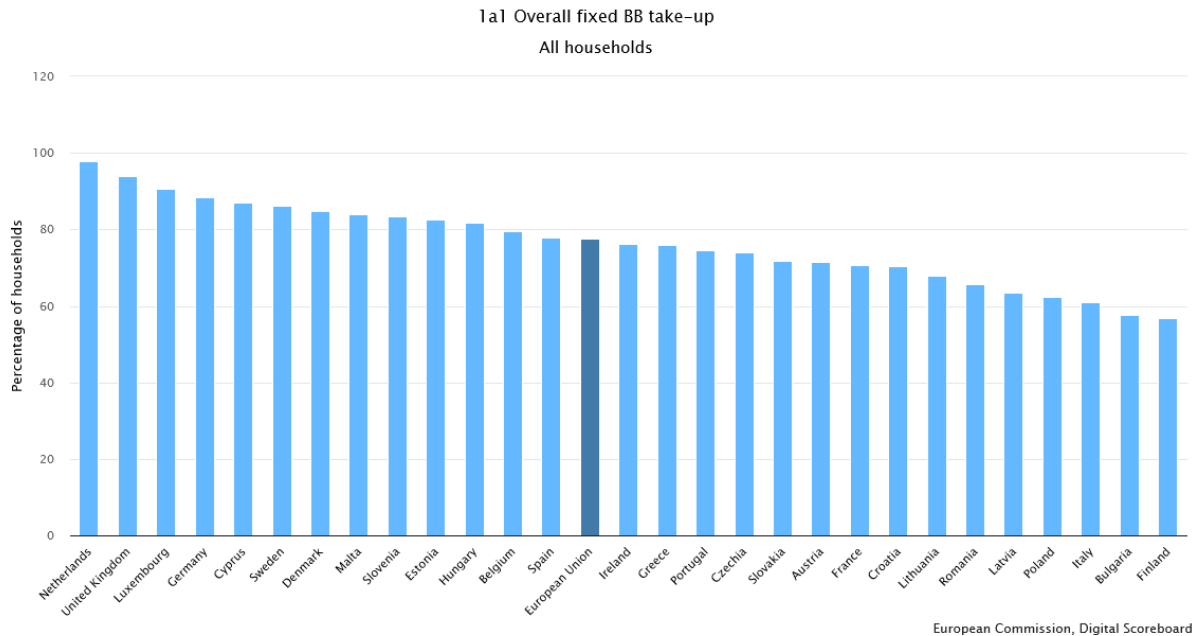
**Figure 9: The 1 Connectivity dimension of DESI in Hungary compared to other EU Member States (2020)**

Note: DESI Connectivity Dimension is calculated as the weighted average of the four sub-dimensions: 1a Fixed Broadband take-up (25%), 1b Fixed broadband coverage (25%), 1c Mobile broadband (35%) and 1d Broadband price index (15%).

Source: European Commission (2020d)

In terms of overall fixed broadband take-up, Hungary ranked 11<sup>th</sup> with 81.8% of households subscribing to fixed broadband, while the EU average was 77.6%. However, only Sweden, Portugal and Spain had a higher score than Hungary in terms of 100 Mbps or higher fixed BB take-up (1a2 At least 100 Mbps fixed BB take-up). In Hungary, 50.9% of households subscribed to fixed broadband of at least 100 Mbps, while the EU average was 25.9%. The fast broadband coverage (1b1 Fast BB (NGA) coverage) which denotes the percentage of households covered by fixed broadband of at least 30

Mbps download was slightly higher than the EU average (89.6% compared to 85.8%), while the ‘1b2 Fixed Very High Capacity Network (VHCN) coverage’ was slightly lower (42.6% compared to 44%) (Figure 10).

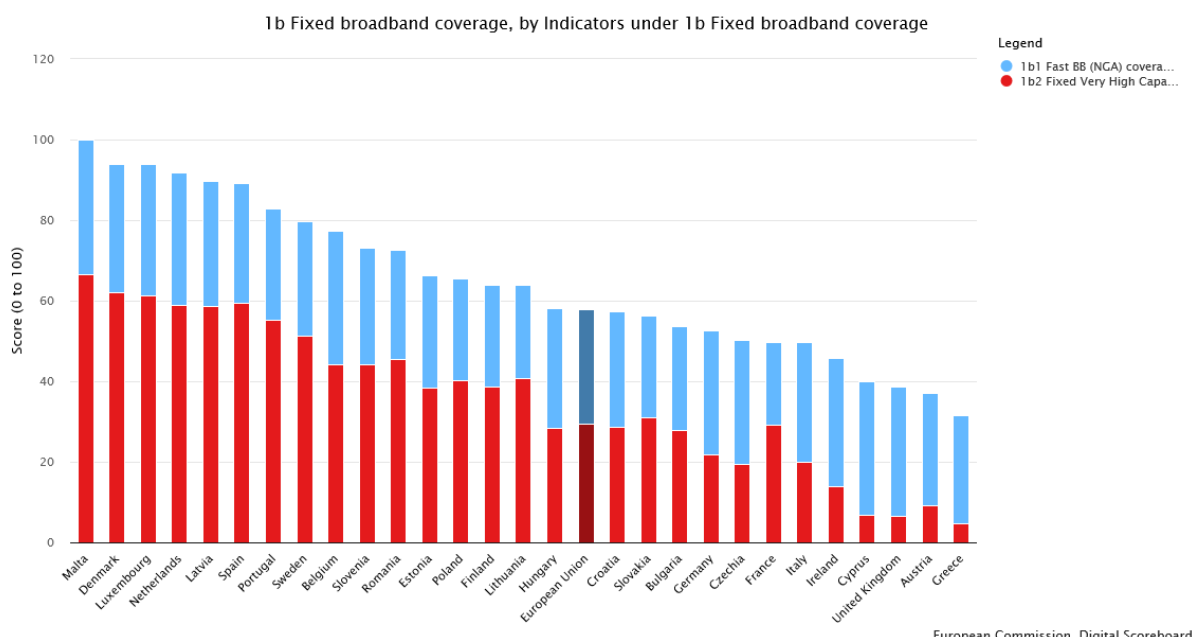


European Commission, Digital Scoreboard

**Figure 10: The 1a1 Overall fixed BB take-up in Hungary compared to other EU Member States (2020)**

Source: European Commission (2020d)

The Fixed broadband coverage consisted of two parts, the 1b1 Fast broadband (NGA) coverage (50%) and the Fixed Very High Capacity Network (VHCN) coverage (50%). Hungary ranked 16<sup>th</sup>, and its score was around the EU average (Figure 11). According to the European Commission (2020b), there was a large gap between urban and rural areas in terms of Very high capacity network (VHCN) coverage, despite the growth after 2015.

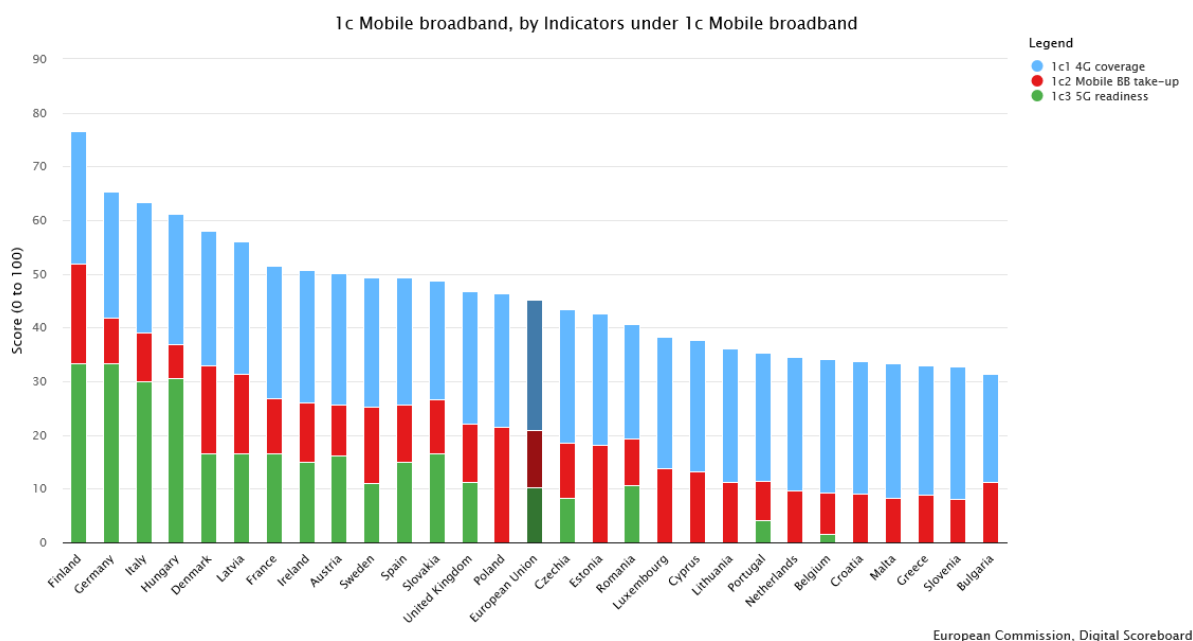


European Commission, Digital Scoreboard

**Figure 11: The 1b Fixed broadband coverage in Hungary compared to other EU Member States (2020)**

Source: European Commission (2020d)

The Mobile broadband situation was favourable as well, since Hungary ranked 4<sup>th</sup>, after Finland, Germany and Italy. Its score exceeded 60, well above the EU average. The 4G coverage ranking was unfavourable, but this was due to the overall high coverage among the EU Member States. Hungary’s score reached 96.8%, while the EU average was 96.5%. Even the last ranking country, Bulgaria had a score greater than 80%. This implies that the EU’s populated areas have high coverage by 4G. At the same time, 5G readiness varied considerably between the Member States. Hungary’s score was extremely favourable, since it ranked 3<sup>rd</sup> after Germany and Finland, with a score of 61.1% (which denoted the amount of spectrum assigned and ready for 5G use by the end of 2020 within the so-called 5G pioneer bands). The EU average was only 20.5% due to several countries having no score. We have to add that in 2019, Hungary’s score was only 7.50%, which implies a high level of development in 2020, compared to the previous year (Figure 12). Vodafone launched 5G commercial services in Budapest in October 2019, while later, in mid-April 2020, Magyar Telekom launched 5G services in parts of Budapest and Zalaegerszeg. Furthermore, Telenor undertook 5G mobile tests in several Hungarian cities (European Commission, 2020b). Broken down by region, mobile broadband services used by households reached the highest proportion (65%) in Western Transdanubia, and the lowest proportion (52%) in Central Transdanubia<sup>11</sup>.



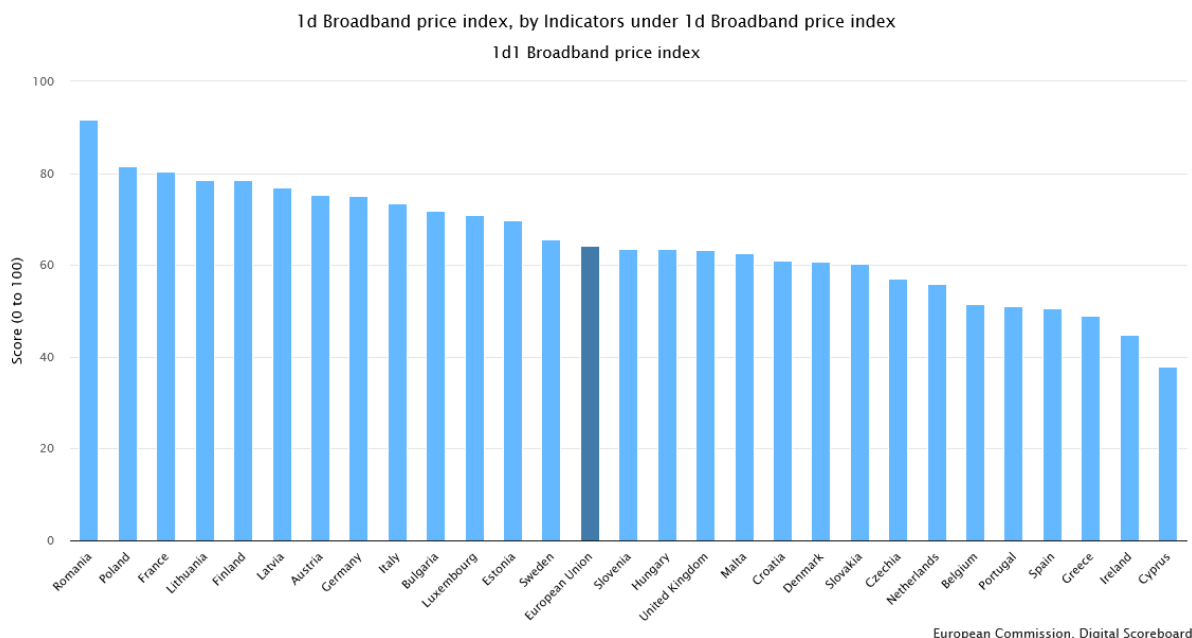
**Figure 12: The 1c Mobile broadband in Hungary compared to other EU Member States (2020)**

Source: European Commission (2020d)

At the same time, in terms of the Broadband Price index, Hungary had an unfavourable position, which indicated that the country still lagged behind in terms of affordability. As the GHS (2019) noted, there

<sup>11</sup> Source: <https://www.ksh.hu/docs/hun/xftp/idoszaki/ikt/2020/01/index.html>

was significant territorial disparities in both the price and quality of packages for Internet access. The size of the settlement is a critical point, and as a territory the Northern Great Plain lags behind the rest of the country most of all (Figure 13).



**Figure 13: The 1d Broadband price index in Hungary compared to other EU Member States (2020)**

Source: European Commission (2020d)

The relatively favourable broadband position of Hungary was due to the fact that it was a main pillar of Hungary’s 2014-2020 national infocommunication strategy. It has an important part in the Digital Success Program and is supported by the Superfast Internet Program (SIP).

The **Superfast Internet Program (SIP)** declared that by 2020, all households should have access to at least 30 Mbps Internet access and at least 50% of households should have access to 100 Mbps Internet access. The tasks of the Program include the preparation of the developments necessary for national Internet coverage, including telecommunications market and territorial surveys, strategic, financial and infrastructural and development planning, economic studies, preparation of emerging tenders, and elaboration of detailed technical materials of tenders, by conducting the application process, evaluating incoming applications, and preparing grant decisions (Governmental Agency for IT Development, 2021). It was launched in 2015 and the program is accessible to every Hungarian household which requests it, either by cable or wireless connection. In the first phase, 216 thousand connection points were built from state subsidies and 407 thousand points were established from market financing. The programme is currently in its second phase which focuses on optical network developments to provide at least 100Mbit internet speed. In this phase, HUF 4.1 billion is available for developments to extend network coverage and increase internet speed in 72 districts affecting 62 thousand households (Government of Hungary, 2020). The deployment of public wi-fi networks was supported by the SIP programme which mandated that a free wi-fi hot spot was to be installed in every settlement covered by the project. Under this programme, 2350 settlements were covered in rural

and underdeveloped areas (European Commission, 2020b), of the total of 3155 settlements of Hungary, while the total number of municipalities was 2809 (as of January 1, 2019)<sup>12</sup>.

These programs were further supported by the **Gigabit Hungary Strategy** for the period 2020-2030, which was based on the extension of the Digital Success Program (2017) and the 456/2017. (VII.19.) government decision. According to its aim, Hungary should be the first EU Member State with an extremely high-bandwidth data transmission network. According to the model estimations, it would cost gross 321 billion HUF, but it would provide a competitive advantage to the industry and business stakeholders. The main target is to provide residents, businesses and public institutions with coverage of at least 1 Gbps symmetric bandwidth internet access for 2025 of 75%, 70% and 65%, respectively, which should increase to 95%, 100% and 100% for 2030 (eNet, 2019).

To further support 5G readiness, the **5G Coalition (5GC)** was established in June 2017 and now has 87 members. Its aim is to allow Hungary to evolve into a major European centre of 5G developments and to be among the first in the world to introduce 5G. The 5G Coalition was able to bring together the representatives of the Hungarian 5G ecosystem, and it provided expertise for the dissemination and introduction of 5G. It also works on areas such as the health aspects and safety issues of 5G, providing test cases, establishing multidisciplinary cooperation with different vertical industries, the utilisation of the Hungarian innovation potential and the development of international knowledge transfer<sup>13</sup>.

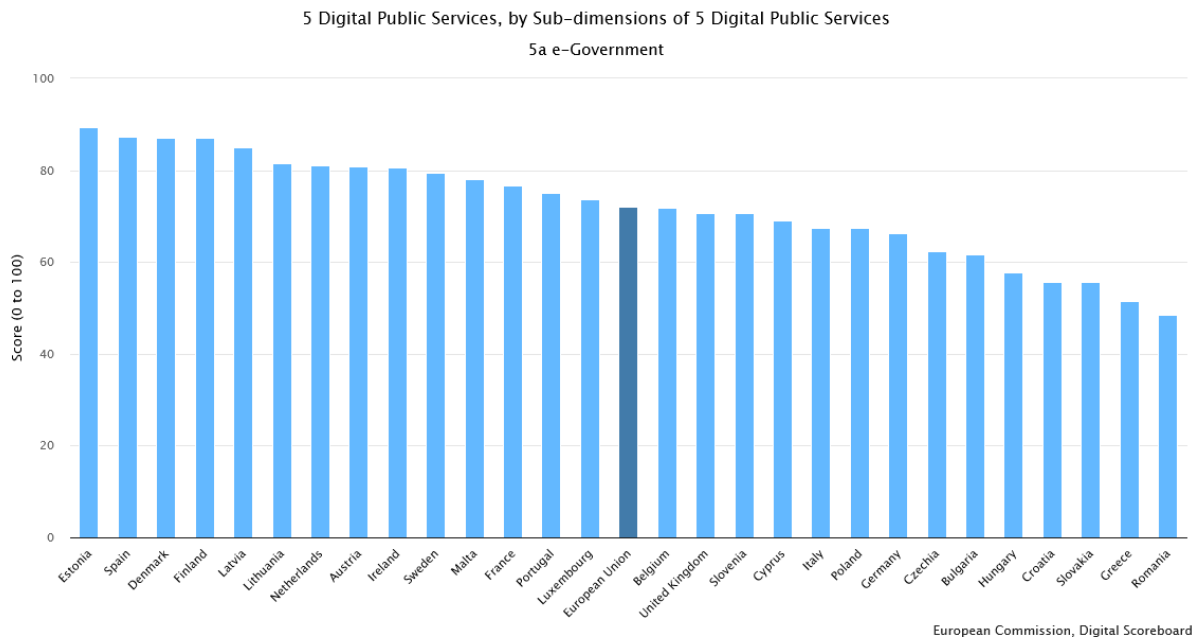
### 3.2.2. Digital Public Services

Hungary ranked among the worst performers in terms of 5 Digital Public services. Its score was 57.8 in 2020, which was lower than the EU average of 72 (Figure 14). There were two main reasons for the disadvantage: the lack of digital competencies among high proportion of the population and the unfavourable quality of services. Both the acceptance and the quality of the services could be improved by a stronger focus on users (European Commission, 2021a).

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<sup>12</sup> Source: [https://www.ksh.hu/teruletiatlasz\\_telepulesek](https://www.ksh.hu/teruletiatlasz_telepulesek)

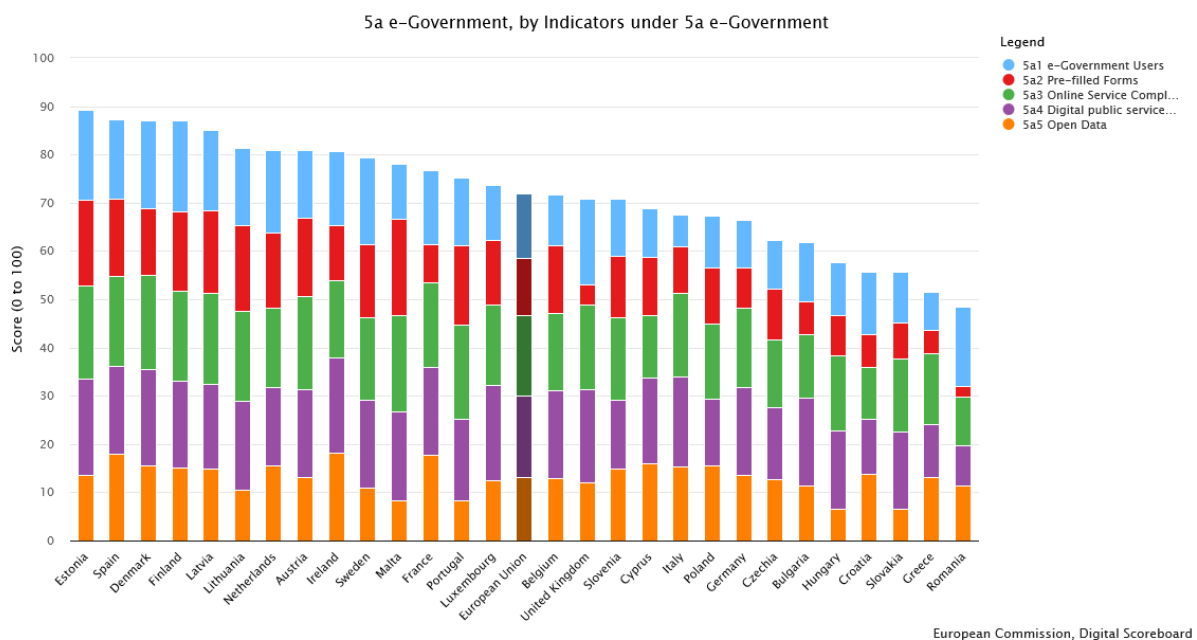
<sup>13</sup> Source: <https://5g.hu/en/5g-coalition/introduction>



**Figure 14: 5 Digital Public Services index of Hungary in 2020 compared to the EU Member States**

Source: Based on European Commission (2020d)

Based on the e-Government index, Hungary was among the worst performing Member States as well. Hungary ranked 24<sup>th</sup> in 2020 among the EU Member States (Figure 15). According to the European Commission (2021a), the digitalisation of public services has proven to be challenging in Hungary. While the proportion of e-government users was slightly above the EU average, since 70% of internet users interacted online with the administration in 2020, the overall situation is still among the worst in the EU. The reason behind this is the low quality of e-government, mainly because of the lack of cross-border services and the weakest performance of Hungary in the EU on Open data.

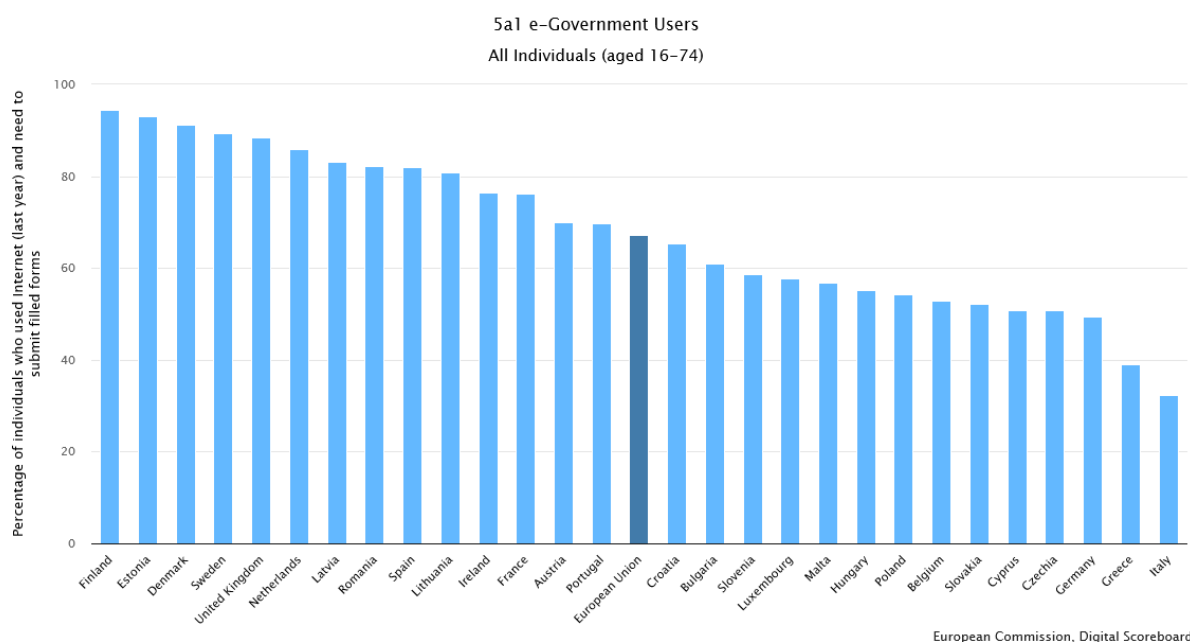


**Figure 15: 5a e-Government index of Hungary in 2020 compared to the EU Member States**

Note: DESI e-Government sub-dimension calculated as the weighted average of the normalised indicators: 5a1 e-Government Users (20%), 5a2 Pre-filled Forms (20%), 5a3 Online Service Completion (20%), 5a4 Digital public services for businesses (20%) and 5a5 Open Data (20%).

Source: Based on European Commission (2020d)

The number of e-Government users in Hungary was low in 2020, compared to other EU Member States. Hungary ranked 20<sup>th</sup> with 55.2%, while the EU average was 67.3% (Figure 16).



**Figure 16: 5a1 e-Government index of Hungary in 2020 compared to the EU Member States**

Note: People who sent filled forms to public authorities, over the internet, previous 12 months

Source: Based on European Commission (2020d)

In recent years, Hungary has paid considerable attention to the digitalisation of public administration.

- **e-administration procedures**

The **Central Identification Agent** (Központi Azonosítási Ügynök, KAÜ) is a comprehensive identification service that identifies in regulated electronic administration services and forwards it to users and institutions. The service provides identification of users to different professional public systems. The KAÜ service includes the password identification of the customer portal as well as the personal identification provided by the Government<sup>14</sup>. Since February 2018, eServices already integrated with the KAÜ can be accessed via the Client Gate trusted profile, the national eID card and a partial code telephone authentication (European Commission, 2020g).

- **e-health and e-education**

<sup>14</sup> Source: <https://szeusz.gov.hu/szeusz/kaü>

The national e-health system is called **National eHealth Infrastructure** (Elektronikus Egészségügyi Szolgáltatási Tér, EESZT), which was joined by general practitioner services, outpatient and inpatient care institutions and all pharmacies on 1 November 2017. Through the EESZT therapists and pharmacists gain access to information necessary during a medical examination. After Client Gate identification and entry with the Social Security Number (TAJ), patients have access to all the information related to their healthcare, including eReferrals and ePrescriptions<sup>15</sup>. Further improvements in the digitalisation of the health industry is expected to be strongly supported by the **DEFS - Digital Healthcare Development Strategy** of Hungary (Digital Success Program, 2017). More than 20 new functionalities were implemented during the pandemic, which included collecting and reporting pandemic-related data, ordering protective materials and devices, and registering for COVID vaccinations (European Commission, 2021a).

- **Digital identity**

A permanent personal identification card (**personal e-ID**) was introduced in Hungary on 1 January, 2016, which is able to take over the functions of visual and electronic personal identification, electronic signature health insurance cards (TAJ cards) and tax cards. Since 1 January 2016, permanent personal ID cards have been equipped with an electronic data carrier/storage unit (chip), which electronically contains all personal data and document data visually displayed on the permanent personal ID card. In addition, the e-ID contains the following data: the citizen's fingerprint under general circumstances, the data required for creating an electronic signature, the social security identification number, the tax identification number, the unique electronic identifiers of the card and, upon request, two telephone numbers. From 1 January 2016, Hungarian citizens living abroad may apply for a personal identification card<sup>16</sup>. Around 57% of the population (approximately 5.5 million persons) had an e-ID card as of 31 March 2021. The Hungarian e-ID scheme is expected to become the part of the eIDAS Network by 2022 (European Commission, 2021a).

- **Digital signature and timestamp services**

In almost all cases, **electronically signed statements may be used in almost any case** in Hungary (but for example real property transfer contracts and wills and marriages require a handwritten signature). To apply for the digital signature, citizens must have a valid e-ID card with an e-signature function, among other things<sup>17</sup>.

- **On-line banking (transfers, account management, payments)**

**Virtually all commercial banks have online banking facilities** in Hungary, using mainly self-developed applications. The **Electronic Payment and Settlement System** (EFER) provided by

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<sup>15</sup> Source: <https://e-egeszsegugy.gov.hu/web/eeszt-information-portal/home>

<sup>16</sup> Source: [https://eszemelyi.hu/in\\_english](https://eszemelyi.hu/in_english)

<sup>17</sup> Source: [https://eszemelyi.hu/in\\_english](https://eszemelyi.hu/in_english)



the NISZ Zrt.<sup>18</sup>, supports the electronic payment service for both electronic and traditional paper-based procedures.

- **Bills (council taxes, water, electricity)**

The **Magyar Posta** (Hungarian Post Office) provides the possibility to pay electronically in the following areas: monthly bills, mobile phone bills, telephones, notebooks, tablet instalments, landline phone bills, internet accounts and TV instalments<sup>19</sup>. In addition, other types of bills (for example water bills, electricity bills, internet bills) can also be paid electronically. However, we do not have information on how common this is among the Hungarian population.

In Hungary, since 2018 all public administration bodies have been legally obliged to provide online services without requiring physical attendance. Only a few hundred have their dedicated services or structured electronic forms; all other cases may be initiated online by the **ePaper general online form service**. This is due to the economic benefits of using the ePaper service rather than developing a completely new one (European Commission, 2020g). The ePaper is a free, authenticated messaging application that electronically connects customers with a Customer Gateway to institutions connected to the service via an Internet connection<sup>20</sup>.

The **National Infocommunication Service Company Ltd.** (NISZ Nemzeti Infokommunikációs Szolgáltató Zrt.) is the leading ICT provider in the public sector in Hungary. It supports the Hungarian public sector by using modern infocommunication technologies, and thus provides telecommunications, IT and e-government services for all public institutions, 4 million citizens and more than 500,000 companies. The created platform allows users to manage their tax declarations, and passport applications and allows the interaction with governmental bodies online in a fast and secure way<sup>21</sup>.

The Government has established a **Digital Government Agency Ltd.** (Digitális Kormányzati Ügynökség Zrt., DKÜ Zrt.). It aims to make public IT expenditure more transparent and systematised and to standardise public IT procurement. Through the unification of IT procurements, the systematised procurements improve the efficiency of state-owned companies, public administration or public utility services<sup>22</sup>. The **Digital Government Development and Project Management Company** (Digitális Kormányzati Fejlesztési és Projektmenedzsment Kft., DKF Kft.) aims to contribute to the monitoring and implementation of developments in e-government, information technology and the infocommunication infrastructure<sup>23</sup>. The **Government Software License Management Company** (Kormányzati Szoftverlicenc-gazdálkodási Kft., KSZG Kft) established and operates a centralised software license management system for the organisations concerned, established and maintains a software license record, performs software license management and license optimisation activities,

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<sup>18</sup> Source: <https://nisz.hu/hu/efer-%E2%80%93-elektronikus-fizet%C3%A9si-%C3%A9s-elsz%C3%A1mol%C3%A1si-rendszer>

<sup>19</sup> Source: [https://www.posta.hu/telekom\\_szamlabefizetes](https://www.posta.hu/telekom_szamlabefizetes)

<sup>20</sup> Source: <https://epapir.gov.hu/>

<sup>21</sup> Source: [https://nisz.hu/en/about\\_us](https://nisz.hu/en/about_us)

<sup>22</sup> Source: <https://dkuzrt.hu/bemutakozas/>

<sup>23</sup> Source: <http://www.dkfkft.hu/index.html>

and ensures that software licenses are used purposefully<sup>24</sup>. Finally, the **National Data Asset Agency** (Nemzeti Adatvagyon Ügynökség, NAVÜ Kft.) has also been established and will support these agencies in the future. Since 2019, all Hungarian local authorities have been connected to the Municipality ASP system, thus the **E-government portal** has become the platform of electronic municipal administration in the municipal ASP system<sup>25</sup>.

Since the available information on Digital Public Service usage is very limited and fragmented, the ratings in **Table III** were based on the authors' personal perceptions.

**Table III:** Digital Public Services usage

		Extremely common	Very common	Fairly common	Not common for most of the population	It is not a possibility nowadays
<b>e-Administration procedures</b>	In general in the country		X			
	In rural areas			X		
<b>e-Health</b>	In general in the country			X		
	In rural areas				X	
<b>e-Education</b>	In general in the country	X				
	In rural areas	X				
<b>Digital identity</b>	In general in the country			X		
	In rural areas				X	
<b>Digital signature</b>	In general in the country				X	
	In rural areas				X	
<b>On-line banking (account management, payments)</b>	In general in the country		X			
	In rural areas			X		
<b>Bills (council taxes, water, electricity)</b>	In general in the country			X		
	In rural areas				X	

<sup>24</sup> Source: <https://kszg.hu/>

<sup>25</sup> Source: <https://ohp-20.asp.lgov.hu/nyitolap>

### 3.2.3. Research and Innovation Strategies for Smart Specialisation (RIS3)

Hungary prepared the **National Smart Specialisation Strategy (S3)** for the period 2021-2027, which was adopted with Government Decision 1428/2021 (VII. 2.). It was launched in 2019 and coordinated by the National Research, Development and Innovation Office (NRDI Office), under the professional supervision of the Ministry for Innovation and Technology. The Government's aim is to become a major innovator in Europe by 2030, by boosting the value creation capacity of the innovation ecosystem and the productivity of the business sector. In S3, eight national economic priorities and two horizontal priorities on skills development and modernising the business environment support the program targets (National Research Development and Innovation Office, 2021a).

The eight national priorities include:

- 1) Agriculture and the food industry
- 2) Health
- 3) Digitalisation of the economy
- 4) Creative Industry
- 5) Resource efficient economy
- 6) Energy and climate
- 7) Services
- 8) Cutting-edge technologies

The two horizontal priorities are:

- 1) Public sector and university innovation
- 2) Training and education (Figure 17).



**Figure 17: The priorities of the National Smart Specialisation Strategy (S3)**

Source: National Research Development and Innovation Office (2021a)

The current S3 not only sets out the policy directions until 2027, but also gives a framework for delivering the relevant policy objectives for the whole period. The digitisation and enterprise development domains have been involved in the S3 planning. The targets can be met with the support of the National Digitisation Strategy, the Strategy for Strengthening Hungarian Micro, Small and Medium Enterprises 2019-2030, the National RDI Strategy 2021-2030 and the Artificial Intelligence Strategy. Furthermore, the S3 strategy drew heavily on community input, community forums, surveys and consultation with academy and industry stakeholders. These included the National Innovation Forum with more than 2500 stakeholders in 2019, a nationwide survey (S3 online survey) with more than 800 responses, and finally the creation of Territorial Innovation Platforms (TIPs) to bring together academy, education, industry, government and society. TIPs were established in eight cities in Hungary with more than 1100 participants (National Research Development and Innovation Office, 2021b).

It is important that the S3 strategy has a strong regional focus, and addresses the territorial level in order to plan the distribution of resources between specialisations, despite its national scope. The regions were classified as knowledge regions, industrial production zones and moderate knowledge and technology intensive areas. The North Great Plain region was located in the knowledge and the moderate knowledge and technology intensive areas. General objectives have been set for each type of region, where the development trajectory of the counties is concerned. These regions aim to further strengthen the knowledge centres and the university-centred innovation ecosystem and stimulate openness to R&D and innovation among regional actors, which could contribute to the further digitalisation of agriculture and food industry (National Research Development and Innovation Office, 2021b).

### 3.2.4. Digital Innovation Centres (DIH)

There were 12 Digital Innovation Centres (DIH) in Hungary in 2020, according to the European Commission (2021c). Of the 12 DIH, only 8 were fully operational, 2 were in preparation and 2 were potential DIHs from H2020. From the list, the following DIHs worked in the agriculture and food sector: AddedValue, BME-EET, Demola-Budapest, innomine Digital Innovation Hub, innomine DIH - South Transdanubian branch and the Innoskart Digital Innovation Hub. Demola-Budapest was working in the sector of manufacture of food products, beverages and tobacco (Table IV).

**Table IV:** Digital Innovation Centres (DIH) in Hungary in 2020

DIH name	Website	Objectives of the DIH
<b>AddedValue</b>	<a href="https://www.addedvalueinstitute.com/?page_id=178">https://www.addedvalueinstitute.com/?page_id=178</a>	Supporting manufacturing industry by providing practical advice and support for their problems with innovative methods and digital technologies.
<b>AGRARGAZDASAGI KUTATO INTEZET</b>	<a href="https://www.aki.gov.hu/">https://www.aki.gov.hu/</a>	Research and knowledge centre, performing both public duties and state functions.
<b>am-LAB</b>	<a href="http://www.amlab.hu">http://www.amlab.hu</a>	Provides holistic digitalisation support.
<b>BME-EET</b>	<a href="https://dih.eet.bme.hu/">https://dih.eet.bme.hu/</a>	To increase companies' competitiveness by testing and validating their product ideas before investing.
<b>Demola-Budapest</b>	<a href="https://budapest.demola.net/">https://budapest.demola.net/</a>	An open innovation platform for creative collaboration between businesses, students and higher education institutions.
<b>Dig-I-Hub Kecskemét</b>	<a href="http://iqkecskemet.hu/dih-kecskemet/">http://iqkecskemet.hu/dih-kecskemet/</a>	Offers a "one-stop-shop" service to companies.
<b>EIT Digital Budapest Node</b>	<a href="https://www.eitdigital.eu/about-us/locations/budapest-node/">https://www.eitdigital.eu/about-us/locations/budapest-node/</a>	Consortium of two local universities and their industrial partners, founded to help them maximise their potential.
<b>Industry 4.0 National Technology Platform</b>	<a href="https://www.i40platform.hu/en">https://www.i40platform.hu/en</a>	A network system fostering intensive cooperation.
<b>innomine Digital Innovation Hub</b>	<a href="http://innomine.com/digital-innovation-hub">http://innomine.com/digital-innovation-hub</a>	Offers digital transformation expertise, services and experience to help companies become more competitive.
<b>innomine Digital Innovation Hub Nonprofit Kft.</b>	-	-
<b>innomine DIH - South Transdanubian branch</b>	<a href="http://innomine.com/digital-innovation-hub">http://innomine.com/digital-innovation-hub</a>	Offers digital transformation expertise, services and experience to help companies become more competitive.

<p style="text-align: center;"><b>Innoskart</b> <b>Digital Innovation Hub</b></p>	<p style="text-align: center;"><a href="https://innoskart.digital/en/projektek/digital-innovation-hub/">https://innoskart.digital/en/projektek/digital-innovation-hub/</a></p>	<p style="text-align: center;">Supporting digitisation by facilitating and supporting dialogue, knowledge and technology transfer between service and user companies.</p>
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Source: European Commission (2021c)

It is worth mentioning the role of the **Institute of Agricultural Economics Nonprofit Kft.** (AKI - AGRARGAZDASAGI KUTATO INTEZET), which is a government scientific institute supervised by the Ministry of Agriculture. AKI not only provides market services, but hosts four types of information systems (Market Price Information Systems, MPIS, Farm Accountancy Data Network, FADN, Agricultural Statistical Information System, ASIS and Fish Prices Data Query Interface, HALÁr); thus, its research output and project collaboration is essential in the Hungarian agricultural data collection and transparency.

### 3.3. CAP National Strategic Plans

The European Commission (2020a) prepared a working document called “Commission recommendations for Hungary’s CAP strategic plan” in 2020. Its direct and indirect recommendations included the need for digitalisation, modernisation and knowledge sharing. The recommendation “*Fostering and sharing of knowledge, innovation and digitalisation in agriculture and rural areas, and encouraging their uptake*” included the following:

- 1) Contributing to the EU Green Deal target on broadband connectivity
- 2) Empowering farmers, agri-food businesses and people living in rural areas, by fostering knowledge, skills and technological development, exchange, research, advice, digitalisation and innovation projects.

Thus, the recommendations have an infrastructural and a social dimension. According to the SHERPA database<sup>26</sup>, Hungary is currently in the public consultation phase. Consultations with field experts suggested that early results could be expected only at the end of 2021. The Hungarian Chamber of Agriculture (HCA, Nemzeti Agrárgazdasági Kamara, NAK) proposed a document entitled “Information on the expected framework of the Common Agricultural Policy after 2020”, where they formed an opinion about the expected changes. The organisation's position was in favour of maintaining the current budgetary framework of the CAP, and digitalisation was only marginally mentioned in the dialogue. However, the document also mentions that the budget for digitalisation and other strategies may in some cases complement areas of CAP agricultural support, such as research and development, innovation or digitalisation. At the same time, Hungary has prepared several digitalisation related strategies and programs, especially the Digital Agricultural Strategy (DAS), which implies that digitalisation will remain a priority area beyond 2020.

#### 3.3.1. CAP Integrated Administration and Control System (IACS)

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<sup>26</sup> Source: <https://rural-interfaces.eu/resources-and-tools/timeline-for-eu-programming/>

In the 2014-2020 period, the Hungarian State Treasury (Magyar Államkincstár) acted as a CAP paying agency, an agricultural and rural development support body, an agricultural damage mitigation body and the ISAMM coordinator. It operates the Integrated Administration and Control System (IACS) to support the efficient performance of its tasks, and the recording and processing of data on the use of financial resources. In 2014, the IACS was extended as a response to the new period which started in 2014<sup>27</sup>. However, at the time of writing, we had no information available on other projects or grants.

### 3.4. Other policies and strategies influencing (rural) digitalisation

We have to remark, that Hungary is often viewed as a rural area as a whole (except for the capital city, Budapest), thus in many cases, the development of rural areas plays a significant role in national strategies, and there are specific programs to tackle rural issues, especially the development of rural villages.

#### 3.4.1. Policies and strategies to boost digital literacy and tackle the digital divide

Hungary has launched the **Digital Village Programme (2020)** (DVP, in Hungarian: Digitális Falu Program, DFP) to support the smart villages initiatives of the European Union. The smart villages initiatives are part of the CAP, thus the DVP supports the European Network for Rural Development (ENRD) and the CAP strategic aims. The following policy tools used by the DVP relate to digital literacy and the digital divide:

- **Digital regional development reference training:** this initiative aims to have one person per settlement who has completed the training and is thus able to successfully participate in the digitalisation process.
- **Village Purchasing And Sales Community, Digital Producer Market:** this supports the movement of goods between consumers and producers. This aim strongly supports the Digital Agriculture Strategy as well.
- **Smart City Marketplace:** this aims to develop a Smart City digital platform which facilitates connections between suppliers, developers of smart city products and their potential customers.
- **Digital service and electronic payment ecosystems:** these develop electronic and mobile payment services, especially in rural areas, where there is a significant gap in this area (Digital Village Programme, 2020).

A more general program is the **Hungarian Village Programme (HVP, Magyar Falu Program)**, which aims to improve the quality of life in the countryside (Government of Hungary, 2020). It covers places with a population of less than 5000 persons, representing more than 30% of the total population and more than 91% of the country's towns and villages. Its objective is to retain the population and also

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<sup>27</sup> Source: [https://www.mvh.allamkincstar.gov.hu/hu\\_HU/tevekenysege](https://www.mvh.allamkincstar.gov.hu/hu_HU/tevekenysege), <https://www.mvh.allamkincstar.gov.hu/-/az-mvh-integralt-igazgatasi-es-ellenorzesi-rendszerek-kiterjesztese-ii-er2-es-felkeszítése-a-2014-20-as-kap-ciklus-követelményeinek-kiszolgalasara>

support housing opportunities and other infrastructural developments. Launched in 2019, the programme has continued into 2020. Around 40 million HUF is available for improving the quality of local life (especially for developing public services). Furthermore, 60 billion HUF is available in 2020 to repair the minor road network and the low category roads leading to villages. This has the definitive aim of reducing the divide between urban and rural areas.

Several other programs may influence (rural) digitalisation. One of the major strategies, which has a general focus, but could strongly affect rural areas, is the **DES - Digital Education Strategy of Hungary** of the Ministry for Innovation and Technology (2016b). The strategy aims at the digital transformation of the education system, the digital competencies of the teachers and students, and furthermore, the provision of free digital training to both Hungarian citizens and SMEs and help in the acquisition of the digital competences required by society and the labour market. Furthermore, the **DWP - Digital Workforce Program** already described could support these ambitious goals (Ministry for National Economy, 2018).

The **Development of Digital Competence** project (identifier: EFOP-3.2.4-16-2016-00001) provided 48.35 billion HUF (around 130 million EUR) between 01.01.2017 and 31.08.2021 to develop a quality and equitable public education system by reducing early school leaving, promoting successful participation in lifelong learning and acquiring the digital competences required by society and the labour market. Around 45,630 notebooks and 24,000 tablets were provided to schools, while broadband network connectivity was upgraded in 429 primary schools, 265 secondary schools and 39 vocational schools. In more than 400 vocational schools WiFi networks were under construction (more than 3,500 primary and secondary schools already had a WiFi connection). At the same time, online training was offered to 40,000 teachers and around 238 500 people participated in digital competency development training as a result of several training programmes launched by the government. These competency development programmes aimed to develop competencies among children as well, and a new national core curriculum was launched for grades 1, 5 and 9 (pupils aged 6, 10 and 14) on 1 September 2020 to modernise ICT education (European Commission, 2021a).

It is worth mentioning the so-called **Redesign Program 2.0** (Újratervezés Program 2.0)<sup>28</sup>, which was launched partly as a response to the digital transformation of production and business processes and also to support those who have become unemployed due to COVID-19 who needed further training. Participants can deepen their knowledge after the initial training, which can provide an opportunity to take on jobs that require higher digital knowledge.

Some examples are included in **Table V**:

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<sup>28</sup> Source: <https://ujratervezes.nive.hu/>



Table V: Policies and initiatives addressing digital literacy and digital divide. (\*) International, National, Regional or Local

Initiative	Objective	Key words	Period	Area of impact	Link	Public / Private	Scale of action *	Rural / General
<b>Digital Village Programme</b>	Improving the attractiveness and liveability of small settlements with digital and smart solutions.	smart villages, digitalisation, smart solutions	Not specified.	digital divide, digital literacy	<a href="https://digitalisjoletprogram.hu/">https://digitalisjoletprogram.hu/</a> , <a href="https://www.civitassapiens.hu/">https://www.civitassapiens.hu/</a>	Public	National	R
<b>Hungarian Village Programme</b>	Reinforcing the capability of villages to retain their populations and improving the country side.	villages, digital divide	Not specified.	digital divide, digital literacy	<a href="https://kormany.hu/miniszterelnokseg/magyarfaluprogram">https://kormany.hu/miniszterelnokseg/magyarfaluprogram</a>	Public	National	R
<b>National Digitisation Strategy 2021-2030</b>	1) 95% of households covered by gigabit networks, 2) less than 2% of people without digital skills in the 16-71 age group, 3) more than 30% of processes in the enterprises are digitalised, 4) 90 % of inhabitants use e-government services.	digital skills, digital ecosystem	2021-2030	digital divide, digital literacy	<a href="https://2015-2019.kormany.hu/download/f/58/d1000/NDS.pdf">https://2015-2019.kormany.hu/download/f/58/d1000/NDS.pdf</a>	Public	National	G
<b>DWP - Digital Workforce Program</b>	Improving digital skills and digital literacy. Alleviating the shortage of IT and digitally trained professionals.	digital divide, digital literacy	2021-2027	digital divide, digital literacy	<a href="https://digitalisjoletprogram.hu/en/content/dwp-digital-workforce-program">https://digitalisjoletprogram.hu/en/content/dwp-digital-workforce-program</a>	Public	National	G
<b>Modern Enterprises Programme</b>	Reducing the primary (digital illiteracy) and secondary (low degree of utilisation) digital divide, enabling micro and small enterprises to recognise business opportunities resulting from the introduction of ICT systems and to make use of those opportunities, making available and more durable the benefits of the digital ecosystem to those lagging behind (e-inclusion). Developing the digital competences of micro, small and medium-sized enterprises in Hungary.	enterprise digital literacy, SME digitalisation, digital divide	2018-2022	digital divide, digital literacy	<a href="https://www.vallalkozzdigitalisan.hu/">https://www.vallalkozzdigitalisan.hu/</a>	Public	National	G
<b>DES - Digital Education Strategy of Hungary</b>	Creating the possibility of the effective dissemination of digital literacy in harmony with the sectoral strategies and professional objectives at all levels of the education system, thus contributing to increasing Hungary's competitiveness and avoiding the digital divide of the society.	digital education, digital literacy, life-long learning	There is no definite time frame.	digital divide, digital literacy	<a href="https://digitalisjoletprogram.hu/files/0a/6b/0a6bfcd72ccb12c909b329149ae2537.pdf">https://digitalisjoletprogram.hu/files/0a/6b/0a6bfcd72ccb12c909b329149ae2537.pdf</a>	Public	National	G

<b>Development of digital competence</b>	Developing the digital competencies required by society and the labour market.	life-long learning, digital literacy	2017.01.01. – 2021.08.31.	digital literacy	<a href="https://kk.gov.hu/digitalis-kompetencia-fejlesztese">https://kk.gov.hu/digitalis-kompetencia-fejlesztese</a>	Public	National	G
<b>Újratervezés Program 2.0 (translates to Redesign Program 2.0)</b>	Acquiring basic digital skills, especially for jobseekers and those about to change careers (free of charge).	life-long learning, digital literacy	from 2020 onward	digital literacy	<a href="https://ujratervezes.nive.hu/">https://ujratervezes.nive.hu/</a>	Public	National	G

### 3.4.2. Policies and strategies that incentivise digital innovations

In addition to the strategies and initiatives mentioned so far, there were several agricultural **European Innovation Partnership (EIP-AGRI) projects** in the rural regions. In this section we focus mainly on these initiatives and on the Northern Great Plain region only.

## 3.5. Projects and initiatives with influence in rural areas

According to the European Commission (2021b) EIP-AGRI Projects online database, the following project were ongoing in the three counties of the Northern Great Plain region:

- **Precision plant protection system development and efficiency testing** (Main funding source: Rural development 2014-2020 for Operational Groups (in the sense of Art 56 of Reg.1305/2013)). The project started in 2019 and will end in 2022.
- **Development of the precision cultivation technology of silage maize using site-specific technologies.** (Main funding source: Rural development 2014-2020 for Operational Groups (in the sense of Art 56 of Reg.1305/2013)). The project started in 2019 and will end in 2022.
- **Adaptation of crop mixes adapted to crops and soil types for use in ecological seedlings.** (Main funding source: Rural development 2014-2020 for Operational Groups (in the sense of Art 56 of Reg.1305/2013)). The project started in 2020 and will end in 2022.
- **Improving the physical properties and water management of boundary meadow soils with the help of water management and soil improvers.** (Main funding source: Rural development 2014-2020 for Operational Groups (in the sense of Art 56 of Reg.1305/2013)). The project started in 2018 and will end in 2021.
- **Development of a precision, resource efficient harvesting system.** (Main funding source: Rural development 2014-2020 for Operational Groups (in the sense of Art 56 of Reg.1305/2013)). The project started in 2019 and will end in 2021.
- **Development of environment-friendly frost protection heater equipment for prevention of frost damage in vineyards, orchards and vegetable cultures.** (Main funding source: Rural development 2014-2020 for Operational Groups (in the sense of Art 56 of Reg.1305/2013)). The project started in 2018 and will end in 2022.
- **Development of a low-environmental impact apple growing technology and sales system.** (Main funding source: Rural development 2014-2020 for Operational Groups (in the sense of Art 56 of Reg.1305/2013)). The project started in 2019 and will end in 2022.
- **The integration of the sweet potato production of Nyírség into the food processing chain.** (Main funding source: Rural development 2014-2020 for Operational Groups (in the sense of Art 56 of Reg.1305/2013)). The project started in 2019 and will end in 2023.
- **Development of ecological and low-input complex technology for growing Soya beans.** (Main funding source: Rural development 2014-2020 for Operational Groups (in the sense of Art 56 of Reg.1305/2013)). The project started in 2020 and will end in 2022.

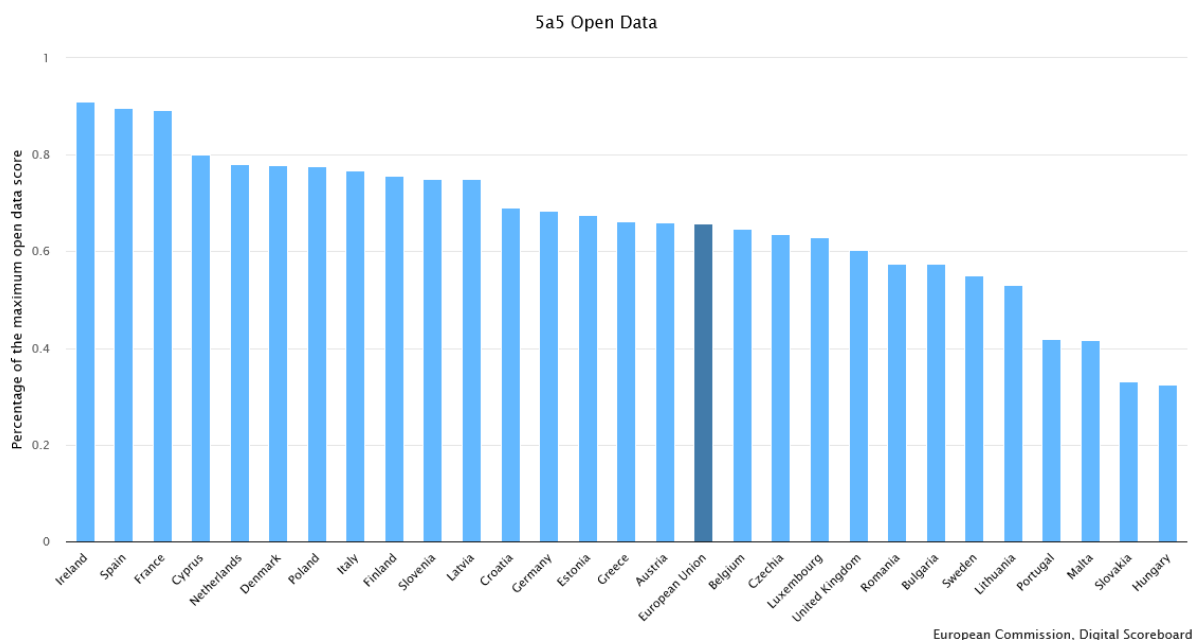
- **Innovative tillage system with the creation of a biological soil food web to maintain and improve soil fertility.** (Main funding source: Rural development 2014-2020 for Operational Groups (in the sense of Art 56 of Reg.1305/2013)). The project started in 2019 and will end in 2022.
- **Recondition and renewal of soil fertility with ecosystem services.** (Main funding source: Rural development 2014-2020 for Operational Groups (in the sense of Art 56 of Reg.1305/2013)). The project started in 2020 and will end in 2022

Initiatives of the **Digital Village Programme (2020)** could be mentioned here as well, since it incentivises digital innovations and focuses on the rural regions only. The following initiatives could be mentioned here:

- **“Településszonda”**, which translates as “Settlement probe”: Its aim is to formulate proposals, which reflect the needs of the local community to more efficiently organise the selected settlement and the regional service system. An important part of this aim is to measure the local stakeholder demands and preferences empirically.
- **Rural Settlement and Investment Platform:** This intends to help settlements in villages by setting up an online GIS system.
- **Rural labour market module:** This aims to increase the popularity of rural villages through digitalisation by providing “Career Village”, rural community offices and creating a settlement development model based on hybrid employment.
- **Protection of persons and property:** This aims to building a new network of surveillance cameras or optimise the efficiency of existing camera systems.
- **Integrated waste management:** This aims to develop an application which helps to optimise the village waste flow.
- **Village energy community:** The aim is to create a renewable energy community.
- **Municipal air quality measurement, detection and sanctioning:** Its aim is to improve the village environment, especially to improve air quality.

### 3.6. Data management

Open data would be important for the usability of research results but Hungary has the lowest score in the EU for open data. To tackle these problems, the Hungarian government is about to establish a **new governmental data agency (National Data Asset Agency Ltd., Nemzeti Adatvagyon Ügynökség Kft., NAVÜ)**. The main goal of NAVÜ would be the development of a new model for managing the use of public data and creating an optimal legal framework (European Commission, 2020f). The National Council for Telecommunications and Information Technology published the **WHITE PAPER on National Data Policy** in 2016 as a response to the changing EU directives and global economic environment. Before that, Hungary did not have its own data policy, and re-use of public sector data was not possible due to the lack of a public sector data portal. The government has approved the Government Decree No. 1310/2015 (V. 21) on measures required for the broad-scale re-use of public sector data. The White Paper forms the basis of the Government’s uniform data policy that would facilitate the re-use of public sector data, which recommended establishing a national data policy and taking effective practical measures. Furthermore, an effective enforcement mechanism would be needed, as well as changes related to the nation’s data assets, organisational structure, legislations, standards, methodology and technological toolkits. The White Paper has recommended that the production of data be financed from the central budget (National Council For Telecommunications and Information Technology, 2016). The concerns are not without basis. According to the DESI index, in 2020 Hungary ranked last among the EU Member States in terms of open data. Compared to the 32.4% maximum open data score achieved by Hungary, the EU average was 65.9% (Figure 18).



**Figure 18: 5a5 Open Data index in Hungary compared to other EU Member States (2020)**

Source: European Commission (2020d)

This could change with initiatives, such as **Opendata**<sup>29</sup>. It was launched in 2020 and is a free and public Hungarian data catalogue, created by volunteers and non-governmental organisations with the aim of creating the first Hungarian open website collecting data and databases.

It is a favourable development that Hungary has also launched several programs to overcome these issues directly or indirectly. According to the Ministry for Innovation and Technology (2020a), the **Hungarian Artificial Intelligence Coalition** was started in 2018 to provide a community and a forum for the artificial intelligence ecosystem. As a result, an **Artificial Intelligence Strategy** was developed which sets related targets for 2030. The following **high-level targets** were set for 2030:

- 1) 15% AI-induced GDP growth and AI adaptation above the regional average
- 2) 26% average productivity growth in the Hungarian corporate sector compared to 2020 (increase in gross value added per employee)
- 3) As a result of changing or creating jobs, 1 million citizens create new, higher value-added AI-supported jobs

**Targets for 2030 that directly affect citizens:**

- Hungary is the number one European centre for the development and testing of autonomous vehicles
- 2 million citizens are actively involved in the care and use of their own data with the help of their digital wallets
- 70% of renewable energy production is scheduled using smart technology
- Ammonia emissions in agriculture are reduced by 32% due to the use of data-based systems
- 2.5 million citizens received AI-supported education
- 60% of the administration is done electronically, in a self-service way
- AI is integrated into the health care system; 3 million citizens receive state-of-the-art AI-based services through the integrated digital health system.

Data management is a special area within the AI strategy. One of the primary goals of the strategy is to **Start a data economy**. The aims are the following:

- Create and raise awareness of the economic value of legally marketable data and to encourage their secondary use.
- Establish comprehensive, responsible public data management, including the sharing of high-multiplier public sector data sets that do not contain personal data, in order to increase the economy's performance.
- Define a standardised data generation and data format that allows easy access to data for research and development use and to monitor the use of public data at the organisational level.

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<sup>29</sup> Source: <http://opendata.hu/>

- Ensure the market-based trading of data with a high multiplier effect generated in the public sector but not covered by Directive 2019/1024/EU on open access data; furthermore, to reuse public sector information.

However, Hungary's total **high performance computing (HPC)** capacity is currently less than 0.5 petaflops, which is not enough for advanced R&D needs. The government launched the national HPC development plan in 2019 to expand the national HPC infrastructure and ecosystem. In the first phase, a 5 petaflop HPC centre will be installed at Debrecen University by the end of 2021 (European Commission, 2020f). Since data protection, collection and efficient use are already integrated in these strategies, the expected results would affect problems related to the focal question as well, since efficient data use and climate smart agriculture is highly integrated. The strategy has agriculture as a focus area. The primary goal would be the implementation and dissemination of AI developments supporting the digital renewal of the agricultural sector, especially the use of data-driven artificial intelligence solutions to mitigate the effects of climate change, reduce emissions and increase farmers' incomes. This could be attained by:

- structuring, making available, developing and improving the data supply of existing data assets,
- strengthening the agricultural research and development base and the innovation ecosystem,
- providing test environments,
- introducing and distributing automation and AI applications,
- developing AI-based services.

The strategy would involve the efficient training of employees who can use the advantages provided by AI (Ministry for Innovation and Technology, 2020a).

Hungary has established its own **National Cyber Security Strategy** by Government Decision No. 1139/2013 (21 March) on the National Cyber Security Strategy of Hungary. The strategy *“aims at developing a free and secure cyberspace and protecting national sovereignty in the national and international context”*, and furthermore, *“protecting the activities and guaranteeing the security of the national economy and society, securely adapting technological innovations to facilitate economic growth, and establishing international cooperation in this regard in line with Hungary's national interests.”* The strategy is strongly influenced by the European Union laws and targets and by the needs of the changing digital environment of present times. The Strategy is in conformity with the recommendations included in Decision No. 2012/2096(INI) on cyber security and defence by the European Parliament for the Member States, with the document entitled *“Cybersecurity Strategy of the European Union: An Open, Safe and Secure Cyberspace”* published by the European Commission and the High Representative of the Common Foreign and Security Policy of the European Union and with the Strategic Concept of NATO (Government of Hungary, 2013).

Furthermore, it is important to add, that not just the general public, but especially children received special attention in terms of cybersecurity. The Government adopted the resolution of 1488/2016. (IX.2.) of Hungary on the **Digital Child Protection Strategy**. The decision was a response to the new kind of threats to children due to the active internet usage which required a new set of tools. This strategy is an integrated part of the Digital Success Program and it aims to give greater prominence to

rules and measures to protect children and to support conscious, value-creating use of the Internet (Ministry for Innovation and Technology, 2016a).

## 4. Challenges and Opportunities

In this section we describe the main barriers facing digital transition in rural areas and agriculture. We focused on agriculture only since it is the main profile of agriculture holdings in the North Great Plain region.

### 4.1. Barriers to digitalisation

Table VI summarises the barriers to digitalisation and the influence of COVID-19. The following barriers were identified:

- **Technical:** Limited availability of open data or any other, free accessible data, and a lack of innovation. The lack of innovation is a long-term problem of Hungarian agriculture and the food industry (Tóth & Rizzo, 2020). Open data and increased data collection would allow for data-based management, decision-making and (open) innovation possibilities.
- **Legal:** A supportive legal environment would be necessary, especially to provide long-term land use security. This problem and possible solution was based on Gaál et al. (2020).
- **Training/Education:** A lack of digital skills among the population, especially related to new technologies, and generally low education levels and a lack of digital competencies among farmers. These are possibly the greatest barriers to digitalisation, and are further exacerbated by the high price of the technology and the fact that producers do not always recognise the benefits of precision technology. However, there is a greater attention placed on education and training, partly to due to COVID-19.
- **Economic:** The high price of precision agriculture technologies and the lack of capital among small-scale producers. Beside the high price of investment, producers often remarked that precision agriculture does not fit the size of the farm (Gaál et al., 2020). This was further exacerbated by COVID-19 due to revenue loss.
- **Other:** A lack of a tendency to cooperate. In generally, it has been a long term-problem that the willingness to cooperate among market stakeholders is insufficient.

**Table VI:** Barriers to digitalisation

Barriers to digitalisation		Influence of COVID-19
<b>Technical</b>	Limited availability of open data or any other, free accessible data, lack of innovation	Neutral or no change



<b>Legal</b>	A supportive legal environment would be necessary, especially to provide long-term land use security	Neutral or no change
<b>Training / Education</b>	Lack of digital skills among the population, especially related to new technologies Generally low education levels among farmers Lack of digital competencies among farmers	Strongly boosted the rate of adoption and the spread of new skills and technologies in education.
<b>Economic</b>	High price of precision agriculture technologies Lack of capital among small-scale producers	Neutral or no change with respect to technology prices, negative with respect to capital
<b>Others</b>	Lack of tendency to cooperate	Neutral or no change

## 4.2. Actions to boost sustainable digitalisation

These recommendations were based on our perception and assessment of the available strategies, initiatives and research on the digitalisation of agriculture in Hungary.

- **Creating the basic conditions for digitalisation:** The development of human capital is essential to create the basic conditions for digitalisation. The development of digital education and digital competencies would be particularly important. This is especially true for agriculture and rural areas, where one of the obstacles to the diffusion of technologies has been the lack of a suitable knowledge base. In order to integrate innovative solutions, it may be worthwhile to create a knowledge network that helps to share good practices (this process has already started in Hungarian agriculture). Securing suitable funding possibilities should be a priority for boosting the level of investment. In terms of governance, the monitoring of the DESI indexes would be necessary, with frequent local assessment. These concepts were highlighted in many Hungarian digitalisation policies as well. Since the field is changing rapidly, policies are reviewed periodically, creating a kind of “living” policy that can respond to changes in the digital ecosystem.
- **Anchoring digitalisation to sustainable development:** In order to serve sustainable development, it is important to raise awareness and provide appropriate workforce training. This would be supported by an accessible decision support database, the presentation of good practices already mentioned and participation in supporting programs (such as High Technology Farming initiatives for example). This would also require an increased support for green technologies and suitable monitoring of the sustainability performance of these technologies.
- **Adapting digitalisation to different contexts:** Digitisation policies can be applied to different contexts if the demand and supply sides of the ecosystem are appropriately assessed and

aligned. In terms of innovation, the tools already mentioned can be complemented by the support of AgriHub systems, which would provide additional flexibility. In terms of supporting possibilities, this requires coordination with strategies and monitoring at local level.

- **Favouring digital inclusion:** Digital inclusion is key to successful policy-making, as basic digital competences are lacking in both general and agricultural society. It is necessary to identify the associated vulnerable groups that may require specific support structures and measurement systems. An extensive knowledge network is also important in this case. The European Commission (2021a) has already suggested the importance of user-friendly services (in terms of digital public services), which could also improve digital inclusion in agriculture.
- **Developing digital ecosystems, developing adaptive governance models and designing policy tools for sustainable digitalisation:** An appropriate digital ecosystem can only be achieved through increased cooperation and training, which can be one of the critical factors, especially in agriculture and food industry. The lack of cooperation in agriculture and its moderate efficiency is expected to slow down the development of the ecosystem as well. Data collection and sharing, transfer of good practices and appropriate support are key factors. Ongoing consultation with partners, especially SMEs involved in digitalisation, is essential to develop an appropriate governance system and policy tools for sustainable digitalisation. The European Commission (2021a) also suggested that more effective support is necessary to foster the digital transformation of SMEs, which was recognised by the government as well. It is worth noting that steps towards building a knowledge network, sharing good practices and frequent consultation with partner organisations have already been taken.

**Table VII:** Actions to boost sustainable digitalisation

	Key rural development domains			
	Human capital	Innovation	Investments	Governance
Creating the basic conditions for digitalisation	Digital education, as well as specific training in agriculture	Involvement in networking and knowledge building	Public support to infrastructure and R&D	Monitoring the progress of DESI indicators with local assessments
Anchoring digitalisation to sustainable development	Raising awareness, education and training	Open Data portal and “good practice” networks, High Technology Farming initiatives	Linking investment to environmentally sustainable technologies, support of precision agriculture	Monitoring the sustainability performance of digitalisation projects
Adapting digitalisation to different contexts	Profiling demand and supply side requirements	Open Data portal and “good practice”	Investments aligned with local strategies	Local community assessments,

		networks, creating AgriHubs		supporting digital villages
<b>Favouring digital inclusion</b>	Mapping vulnerable groups	Encouraging peer-to-peer networking	Specific supports to vulnerable groups	Monitoring the progress of DESI indicators with local assessments
<b>Developing digital ecosystems</b>	Training and cooperation	Data sharing and best practices, creating local knowledge centres	Prioritised support	Monitoring the progress of DESI indicators with local assessments
<b>Developing adaptive governance models</b>	Favouring local community assessments and public evaluation, bottom-up approaches.			
<b>Designing policy tools for sustainable digitalisation</b>	Adaptive decision making with frequent multidisciplinary consultations with academy, stakeholders and the general public (already started)			

## 5. Conclusions

The analysis of Hungary's strategies and initiatives has shown that Hungary recognised the benefits of digitisation after 2015. However, the state of digitalisation in Hungary can be characterised by a strong duality. General digitalisation infrastructure, especially Broadband infrastructure is well developed compared to other EU Member States, but the lack of basic digital skills was high in a significant part of the population. Furthermore, there was a significant lag in the areas of integration of digital technology and digital public services. Rural and gender disparities in terms of digitalisation still remain, but significant progress has been made in recent years. It is favourable that both government and market stakeholders have a proactive approach to digitalisation. Hungary has developed a number of interlinked strategies to increase digitalisation in general, including the Digital Agricultural Strategy, which focuses on the efficient use of digital skills and tools in agriculture. The countryside, and especially villages, have received a special attention. In agriculture, digitalisation is hampered by the low take-up and spread of technologies, their relatively high cost and the high number of micro companies without strong cooperation. In many cases, SMEs in Hungary have not recognised the business benefits of digitalisation. In order for digitalisation efforts to be effective, several areas need to be further improved. On the one hand, the level of general digital skills needs to be improved in order to have an efficient adoption of technologies, especially in the case of small-scale farmers. On the other hand, a system of efficient data collection, processing and sharing must be established and the open and free access to data must be ensured. Data accessibility and transparency must be improved, since in the case of open data, Hungary was among the worst performers in the EU. Open data is a key element in the spread of precision agricultural and AI-based technologies, as well. In order to efficiently implement these strategies in the agriculture and food industry, an innovation and digitalisation “ecosystem” and an efficient advising system must be established with an expanding knowledge base. Furthermore, data-based systems must be created, and presenting and adopting available good practices can also be a key element in reaping the benefits of digitalised agriculture.

## **6. Annex**

## 6.1. Annex A

Table 1: Policies influencing digitalisation in your country

Areas being addressed / supported by the policies	Policy	Brief Description	Objectives	Area of impact	Period of implementation	Budget (if any)	Public / Private	Address rural areas (Y/N) Specify how	Link
Rural access to technologies	Digital Village Programme	Creating smart villages with digital solutions.	Support the smart villages initiatives of the European Union.	Rural	Not specified.	Not specified.	P	The beneficiaries are small rural settlements.	
	Hungarian Village Programme	General program for small villages to improve the quality of life in the countryside.	Improve the quality of life in the countryside.	Rural	Not specified.	HUF 150 billion	P	The beneficiaries are small rural settlements.	<a href="https://kormany.hu/miniszterelnokseg/magyarfaluprogram">https://kormany.hu/miniszterelnokseg/magyarfaluprogram</a>
Broadband, connectivity, affordability	National Digitalisation Strategy	Comprehensive framework strategy.	Comprehensive targets related to digitalisation.	National	2021-2030	Not specified.	P	This policy is nationwide, with a direct effect on rural areas.	<a href="https://2015-2019.kormany.hu/download/f/58/d1000/ND_S.pdf">https://2015-2019.kormany.hu/download/f/58/d1000/ND_S.pdf</a>
	Superfast Internet Program (SIP)	Program for infrastructural development related to superfast internet access.	Large-scale network developments.	National	from 2015	HUF 59 billion state support (178 million Euro)	P	This policy is nationwide, with a direct effect on rural areas.	<a href="https://kifu.gov.hu/szip">https://kifu.gov.hu/szip</a>
	Hungarian 5G Coalition	Professional coalition to support the spread of 5G.	To position Hungary to be one of the European centres of 5G developments.	National	from 2017	Not specified.	P	This policy is nationwide, with a direct effect on rural areas.	<a href="https://5g.hu/">https://5g.hu/</a>
Creation of digital innovation ecosystems in or with influence in rural areas	Digital Village Programme	Creating smart villages with digital solutions.	Support the smart villages initiatives of the European Union.	Rural	Not specified.	Not available.	P	The beneficiaries are small rural settlements.	
New digital business models in rural areas, agriculture, and forestry	DAS - Digital Agriculture Strategy of Hungary	General strategy to improve the digitalisation of agriculture.	Contribute to increasing the profitability of agricultural production through the efficient use of available environmental resources by collecting and processing information, automating and robotising technological operations.	National	2019-2022	HUF 3 billion	P	The strategy focuses on agriculture, which activity is of a rural nature.	<a href="https://digitalsjoletprogram.hu/en/content/das-digital-agriculture-strategy-of-hungary">https://digitalsjoletprogram.hu/en/content/das-digital-agriculture-strategy-of-hungary</a>
Funding of digitalisation (access to technologies, digital education, broadband access, etc.) in rural areas, agriculture, and forestry.	Digital Success Capital Programme	General program for business capital investment.	To support the digital product and service development projects of Hungarian SMEs and start-ups.	National	Not specified.	Not specified.	P	Indirectly.	<a href="https://digitalsjoletprogram.hu/en/content/digital-success-capital-programme">https://digitalsjoletprogram.hu/en/content/digital-success-capital-programme</a>
National rural development networks' initiatives	National Smart Specialisation Strategy (S3)	Policy tool to support "Smarter Europe" objectives,	Boosting the value creation capacity of the innovation ecosystem and the productivity of the business sector.	National	2021-2027	-	P	It has a strong regional focus.	<a href="https://nkfih.gov.hu/english/national-smart-specialisation-">https://nkfih.gov.hu/english/national-smart-specialisation-</a>

									strategy/s3-2021-2027
Digital Literacy and Digital Divide	DES - Digital Education Strategy of Hungary	General strategy to address the lack of digital skills and digital literacy in education.	To obtain adequate digital competencies in education.	National	There is no definite time frame.	Partly from EU funding, not specified.	P	Indirectly. Digital divide is especially high in rural areas.	<a href="https://digitalisjoletprogram.hu/en/content/des-digital-education-strategy-of-hungary">https://digitalisjoletprogram.hu/en/content/des-digital-education-strategy-of-hungary</a> , <a href="https://digitalisjoletprogram.hu/en/content/dwp-digital-workforce-program">https://digitalisjoletprogram.hu/en/content/dwp-digital-workforce-program</a>
	DWP - Digital Workforce Program	General strategy to address the lack of digital skills and the digital literacy of the workforce.	Alleviating the shortage of IT and digitally trained professionals.	National	2021-2027	In line with the priorities of the Economic Development and Innovation Operational Program.	P	Indirectly. Digital divide is especially high in rural areas.	<a href="https://digitalisjoletprogram.hu/en/content/dwp-digital-workforce-program">https://digitalisjoletprogram.hu/en/content/dwp-digital-workforce-program</a>
Open data, standardisation of data, data access, etc...	Artificial Intelligence Coalition	A professional coalition established to define the directions and framework for the development of artificial intelligence in Hungary.	To place Hungary at the forefront of AI developments in Europe and to support the spread of AI developments among SMEs.	National	Not specified.	Not specified.	P	Indirectly.	<a href="https://digitalisjoletprogram.hu/en/content/das-digital-agriculture-strategy-of-hungary">https://digitalisjoletprogram.hu/en/content/das-digital-agriculture-strategy-of-hungary</a> , <a href="https://digitalisjoletprogram.hu/en/content/artificial-intelligence-coalition">https://digitalisjoletprogram.hu/en/content/artificial-intelligence-coalition</a>
	Artificial Intelligence Strategy	Exploiting the benefits of artificial intelligence and addressing the potential challenges.	A cross-disciplinary, horizontal initiative with broad objectives.	National	Strategy for 2030 with action targets outlined for 2025	Gross HUF 319,840,000 for the period from 1 June 2020 to 31 December 2121	P	Indirectly	<a href="https://ai-hungary.com/api/v1/companies/15/files/137203/view">https://ai-hungary.com/api/v1/companies/15/files/137203/view</a>
	DAS – Digital Agriculture Strategy of Hungary	General strategy to improve the digitalisation of agriculture.	Contribute to increasing the profitability of agricultural production through the efficient use of available environmental resources by collecting and processing information, automating and robotising technological operations.	National	2019-2022	HUF 3 billion	P	The strategy focuses on agriculture, which activity is of a rural nature.	<a href="https://digitalisjoletprogram.hu/en/content/das-digital-agriculture-strategy-of-hungary">https://digitalisjoletprogram.hu/en/content/das-digital-agriculture-strategy-of-hungary</a>
Cybersecurity	National Cyber Security Strategy of Hungary	A general strategy as a response to the cybersecurity challenges of current times.	To improve the national cybersecurity situation.	National	Not specified.	Not specified.	P	Does not apply.	<a href="https://www.enisa.europa.eu/topics/national-cyber-security-strategies/ncss">https://www.enisa.europa.eu/topics/national-cyber-security-strategies/ncss</a>

									map/HU_NCSS.pdf
	The Digital Child Protection Strategy	A general strategy to respond to the digital transformation and the increasing use of the Internet among the young generation.	To ensure that children are protected from dangerous and harmful online content and methods and to improve conscious and productive use of the Internet	National	2016-2021, extended to 2022-2027	123 454 000 HUF annually from 2018	P	Indirectly.	<a href="https://digitalisjoletprogram.hu/en/content/dcps-the-digital-child-protection-strategy-of-hungary">https://digitalisjoletprogram.hu/en/content/dcps-the-digital-child-protection-strategy-of-hungary</a>
Rural development networks' initiatives	National Smart Specialisation Strategy (S3)	Policy tool to support "Smarter Europe" objectives,	Boosting the value creation capacity of the innovation ecosystem and the productivity of the business sector.	National	2021-2027	-	P	It has a strong regional focus.	<a href="https://nkfih.gov.hu/english/national-smart-specialisation-strategy/s3-2021-2027">https://nkfih.gov.hu/english/national-smart-specialisation-strategy/s3-2021-2027</a>



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