



DIGITISATION: ECONOMIC AND SOCIAL IMPACTS IN RURAL AREAS

NATIONAL POLICY ANALYSIS

CROATIA



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Executive Summary

Current Croatian position regarding the role of digitalisation in the overall society is barely acceptable. Its recent historical events in the 1990s and 2000s connected with the decomposition of Yugoslavia, creation of several new countries (with war activities) was beside the national confirmation a big transition moment from socialist system to democracy and liberal capitalism. First big global economic crisis at the end of 2000s came in a moment of strong economical growth for Croatia if measured purely on the GDP growth rates. Deeper analysis and consequential effects of depression showed that the base of good economic results for Croatia was not very “healthy” so the recovery took longer than surrounding countries. In July 2013 Croatia entered European Union and got a chance to use the structural funds of the EU. Legal framework regarding all the national policies and activities was being harmonised with EU rules as fast as possible. Strategic documents regarding the digitalisation were also adopted and the goals were set high and optimistic. Two strategic documents were put in force during year 2015 (Strategy for Broadband Development in the Republic of Croatia for 2016-2020, National Framework Programme for the Development of Broadband Infrastructure. However, implementation didn’t go as planned. Main problems detected were demographic and economic parameters showing that only 30% of Croatian area can be covered by commercial broadband infrastructure (based on the expected number of users) and 70% needs additional state/EU funds through projects. Although EU provides the funds the other obstacle is Croatian state organisation. Croatia is divided into 21 county and 576 units of local government. Local government units simply lacked human resources and knowledge for performing structural projects using EU funds as well as knowledge about telecommunications technologies and its market in a view of overall EU legal framework. Result of the aforementioned was that the implementation of the digitalisation strategies was bellow expectations. Solution for the lack of resources in the local governmental units was to centralise the projects on the state level but that was not coordinated well enough. Current position is that Croatia ranks 43th out of the 134 economies included in the NRI 2020, and 19th out of 27 EU Member State based on the Digital Economy and Society Index (DESI) in 2020. However, Croatia rank above average in basic digital skills. In addition to global Covid pandemic disruption of the overall economy two strong earthquakes during the year 2020 hit central part of Croatia. Total estimation on the damage on civil infrastructure exceeds 12 billion Euro. Croatian Recovery and Resilience Plan approved by the Government agrees with the new strategic documents of the Republic of Croatia (e.g. National Plan for Broadband Development 2021-2027, etc.) and the goals of Europe 2030. Having major problems that caused overall poor implementation of the broadband strategies and plans in the late 2010s acknowledged, new direction and goals are more pursuant to the real needs and opportunities of Croatian rural areas while considering the weaknesses and strengths of the Croatia and its broadband infrastructure. Unfortunate events of earthquakes will through the reconstruction activities provide new modern infrastructure (e.g. optic fibres and no copper lines) and help to improve Croatian digital position. Also, implementation of 5G technologies is much faster than the 4G which started in year 2011. It is expected that in the coming years Croatia improves its position in broadband infrastructure and gets closer to the surrounding EU.

1. Introduction

Croatian broadband development started in the year 2005 when first commercially available ADSL service became available on the market. In the year 2007 liberation of market further continued with the access to local nodes and bitstream applications becoming available on the market. Implementation of mobile 4G technology started in the year 2011. Starting position was good based on pure availability of lines with 99% of population having access to copper telephone lines. Evolution of ADSL technology (xDSL, VDSL) continued during time but the demographic and social factors influencing the development were major limiting factors. Only 30% of Croatian areas are fit for commercial broadband infrastructure while 70% are so called *white areas*.

The color of the area is determined as follows:

- white areas - areas where there is no adequate broadband infrastructure and no operator plans to build broadband infrastructure in the next three years,
- gray areas - areas where there is a broadband network of one operator and no other operator plans to build an additional network in the next three years,
- black areas - areas where there are at least two broadband networks belonging to two different operators or at least two networks will be built in the next three years according to the expressed interest of the operators.

In July 2013 Croatia entered European Union and free migration of labour force was available for Croatian workers to many member states. Through the years, proscribed limits of labour force movement disappeared and many educated workers left Croatia. Although national strategies and policies regarding digitalisation put into force after 2013 identified this problem and planned appropriate interventions, their implementation was unsuccessful. Lack of human resources and skills needed for the use of public funds through open calls for infrastructure investments resulted in slow spread of broadband coverage, especially ultra-high-speed internet. Majority of people live in rural areas and studies show that only about 30% of Croatian area is profitable in the perspective of broadband infrastructure.

Local government units due to the small size have limited human capacities and experience in participation and overview of such projects and up to now it was a major obstacle in full implementation of action plans for digitalisation infrastructure in Croatia. Solutions to overcome scarcity of human resources included centralisation of projects on higher level of government organisation but then the new problem of limited coordination of plans and activities between and among local government units became apparent. Covid-19 pandemic slowed the projects f not completely paused them having no direct effect on the factors influencing them. Overall analysis showed that the simplification of procedures and administration burden could greatly improve building up of digitalisation infrastructure.

Overall legal framework is being put in place for the period of the next 5 to 10 years. All the documents are being aligned with the strategic documents of the European Union. Strategic planning is being used and all involved stakeholders are being consulted through several cycles during the document creation. Known obstacles and barriers are identified and suggestion on how to overcome them are made available publicly. Large gap between rural and urban areas and differences between human resources and the level of knowledge, experience and competences became the challenge of digitalisation.

Overall COVID-19 impact on the digitalisation was opposite. Limitation of population movement caused a huge step up in acceptance of the use of digital technologies in all aspects of the society. All available services (e-government, e-health, etc.) improved during the pandemic and became indispensable tools for everybody, and especially in a less populated rural areas with large distances between specialised government offices and services. On the other hand, there was stagnation in the infrastructure build in the country with the starting point of uneven development and a digital gap between rural and urban.

Croatia entered the EU and got access to structural and cohesion funds but Croatian internal organisation became major limiting factor. Division of the state in 21 county and 576 local government units made building broadband infrastructure very complex and overall results in the year 2021 are far from expected. Creation of the e-Government system in the beginning of 2010s and its steady development and infiltration in everyday life of Croatian inhabitants made the services very used and accepted. Pandemic caused by Covid 19 increased usage of e-Government and forced the development of e-Schools and e-Universities. On the beginning of the 5G era as a starting point for Europe 2020 digital agenda Croatia is creating its strategies and action plans to meet the expectations of European Commission as well as improve the quality of life of all inhabitants.

Croatia is progressing its successful implementation of the e-Schools programme, with all Croatian schools (1,320) included in the second phase of the programme. Education, science and research are reflected in the national Recovery and Resilience Plan (RRP), which is expected to give a further boost to the digital transformation of higher education, the digitalisation of research and innovation activities, and finally for further development of digital skills.

Croatian enterprises continued to take advantage of the opportunities offered by digital technologies. They actively participate in online commerce, with 30% of SMEs selling online and 10% selling across borders to other EU countries. The sharp rise in popularity in Croatia of e-invoices, with enterprises' usage up from 12% in 2018 to 43% in 2020, is linked to the amendment of the Law on public procurement which made e-invoices mandatory for enterprises. Croatia is also very committed to promoting and investing in digital technologies through various EU coordinated programmes.

By mid-2022, the Ministry of Economy and Sustainable Development expects to finalise the 2021-2027 National Plan for the Digital Transformation of the Economy. The plan will be a strategic planning act

supporting the overall implementation of the digital measures under Croatia's 2021-2030 National Development Strategy¹.

The 2021-2029 Smart Specialisation Strategy and the National Plan for the Development of Artificial Intelligence are also under development.

Croatia's 2020 National Reform Programme² includes support from the European Regional Development Fund (ERDF) to set up a European Centre for Innovation, Advanced Technologies and Skills Development (ECINTV).

The Croatian Association for Artificial Intelligence (CroAI)³, founded in 2019, gathers more than 170 members consisting of Croatian AI enterprises, start-ups, scale-ups, universities and AI enthusiasts with a view to connecting leading enterprises and start-ups in the field of artificial intelligence in Croatia.

The Centre for Artificial Intelligence and Cybersecurity (AIRI) at the University of Rijeka⁴ connects scientists from various fields working on interdisciplinary research projects. The Regional Centre of Excellence for Robotics (CRTA)⁵ works as a reference centre for research, development and educational activities on robotics and AI⁶.

Innovative centre Nikola Tesla (ICENT) and University of Zagreb Faculty of Electrical Engineering and Computing - ICENT has its roots in the University of Zagreb Faculty of Electrical Engineering and Computing (FER) and is established with the aim of creating a third dimension – innovations based on scientific research. Partnership between ICENT and FER creates a powerful driver that activates the academic and research community for the benefit of the development of the Croatian economy and society.⁷

To continue boosting the digital transformation of the Croatian economy, it is important to support SMEs in raising the uptake of advanced technologies, paying particular attention to start-up ecosystems, businesses in disadvantaged regions and female digital entrepreneurs. This will require a coordinated and comprehensive approach combining incentives, investments, and simultaneously building strong links with the relevant investments in human capital. Ensuring that employees are well equipped with relevant advanced digital skills will enhance the innovation capacity of SMEs. The development of a comprehensive digital strategy for the collection, analysis and exploitation of data across several public and private domains would help to address weaknesses and reinforce strengths in the fields of security, privacy, products and services innovation, both in the private and public domains, and contribute to relevant EU initiatives (for example the 1 Million Genomes Declaration⁸).

¹ https://narodne-novine.nn.hr/clanci/sluzbeni/2021_02_13_230.html.

² <https://vlada.gov.hr/UserDocsImages/Europski%20semestar%202020/National%20reform%20programme%202020.pdf>.

³ <https://www.croai.org/>.

⁴ <https://airi.uniri.hr/>.

⁵ <https://www.tehnozavod.hr/regional-center-of-excellence-for-robotic-technologies-at-the-fsb/>.

⁶ <https://100.fsb.hr/en/118/Regional+Center+of+Excellence+for+Robotic+Technology/>.

⁷ <https://www.icent.hr/en/general-info/>

⁸ Croatia became the 17th EU Member State to sign the Declaration Towards access to at least 1 million sequenced genomes in the European Union by 2022.

Digital in Croatia's Recovery and Resilience Plan (RRP)

The Croatian plan, which involves a total investment of approx. EUR 6.3 billion, includes digital investments of a total of EUR 1,285 billion (20.4% of the plan's budget). It is structured around five priorities: (I) the economy; (II) public administration, the judiciary and the State; (III) education, science and research; (IV) labour market and social security; and (V) healthcare. It also contains a specific initiative on renovating buildings.

- **Economy component:** this includes several investments supporting the digital transition for a total of EUR 576 million, with the largest investments in the digitalisation of transport (EUR 281 million) and energy (EUR 155 million), and the digitalisation of culture and creative industries (EUR 40 million). Other investments in digitalisation are planned in tourism, agriculture, smart working, government services and public infrastructure, and there are plans for grants/vouchers for digitalisation.
- **Public administration, judiciary and state assets component:** total investment for this component is EUR 437 million, with EUR 158 million dedicated to connectivity.
- **Education, science and research component:** this includes digital investments of EUR 158 million, including substantial measures for the digital transformation of higher education (EUR 84 million) and the digitalisation of research and innovation activities in universities and research centres.
- **Labour market and social protection component:** a total digital investment of about EUR 57 million is planned, mostly for the development of digital skills to facilitate the digital transition of the labour market (EUR 44 million).
- **Healthcare component:** this includes a substantial investment (about EUR 44 million) in telemedicine, with the largest investment earmarked for the digitalisation of the National Oncology Network and a national oncology database, plus EUR 8 million on digitalisation of operating theatres. Other smaller measures focus on e-care, tele-transfusion, robotic surgery and digitalisation of diagnostic units.
- **Buildings renovation initiative:** this features a digital investment of EUR 13 million to strengthen capacity to monitor seismic phenomena, plus other smaller measures for the digitalisation of buildings restoration, the planning of future constructions and the setting up of an energy management system.

CARNET⁹, the main body responsible for the digitalisation of education, has fully supported a transition to online teaching and learning as a response to COVID-19. All Croatian schools (1,320) were included in the second phase of the e-Schools programme¹⁰. In 2020-2021, all teachers received personal

⁹ CARNET - Croatian Academic and Research Network –: <https://www.carnet.hr/en/>.

¹⁰ The programme aims to digitally transform the teaching and educational processes in all schools in Croatia by 2022. It strengthens the digital competences of teachers, and then indirectly of students, to prepare them for the 21st century labour market, further education and lifelong learning: <https://pilot.e-skole.hr/en/>.

devices and most schools were equipped with wireless local area networks. The Croatian National Digital Skills and Jobs Coalition¹¹ was involved in establishing regional centres of excellence in vocational education, supporting quality assurance, job market information, employers' involvement in counselling schools, and curriculum enhancement. It also supported the new Foreigners Act (adopted in 2021) which regulates the terms for entry, movement, stay and work of non-EU nationals in Croatia. The act opens the job market to ICT specialists, tech talents and digital nomads by facilitating visa processes and employment opportunities.

Croatia is investing actively to introduce Artificial Intelligence (AI) into education. The AI School Challenge competition, organised by the CroAI¹² association in cooperation with CARNET, encourages primary and secondary school students to learn the basics of AI through the course entitled 'Elements of AI'. Croatia was the first country in the region to translate the course and make it available. Since its launch in November 2020, the course has attracted 21,000 participants.

Raising the digital skills of the population from a young age is one of Croatia's priorities, for example by promoting coding and digital literacy during EU Code Week¹³. In 2020, it was among the top 10 countries in the number of activities organised (1,033), reaching almost 36,000 participants, 46% of whom were women. Croatia continues to award talented students with scholarships in Science, Technology, Engineering and Mathematics (STEM) studies (3,400 scholarships per school year). The Office for Gender Equality, in cooperation with the Central State Office for development of the Digital Society, is creating an Action Plan for Gender Equality and inclusion. The act aims to improve women's digital skills, advance their employability and encourage girls and young women to consider an ICT career and STEM studies.

Despite an increase in the supply of ICT specialists, 68% of enterprises recruiting or trying to recruit ICT professionals still report problems in finding suitable candidates. ICT specialists' shortcomings can directly limit enterprises' capacity of to innovate, provide new digital services and products. It is therefore, vital to tackle the existing skills mismatches in the labour force by increasing the number of digitally skilled experts, by reskilling and upskilling workers and employees, and by promoting ICT careers and STEM studies among women.

Human Capital in Croatia's Recovery and Resilience Plan

The Recovery and Resilience Plan includes investments to support the development of digital skills. The plan includes the continuation of the reform of the education system to improve the basic skills of pupils through increased instruction time and strengthen the link between vocational and adult education and the labour market. The development of new curricula, which will include a focus on the digital transition, is also planned. Alongside, Croatia launches dedicated measures to boost employment, develop skills for the labour market and strengthen pension and welfare systems, with further efforts to combat poverty and social exclusion. The measures are expected to increase the employment rate, improve quality of life and strengthen social cohesion, especially for young people

¹¹ <https://digitalnakoalicija.hup.hr/novosti/>.

¹² <https://www.croai.org/>

¹³ <https://codeweek.eu/>

and the self-employed. Fostering lifelong learning and upskilling of workers through investments to adapt to labour market needs will contribute to the employability of all generations. A system or model for reskilling/upskilling will also be developed in line with the needs of the economy and through the proactive role of the Croatian Employment Service (CES).

Skills acquisition is also partially addressed in other areas of the plan for example by implementing a voucher system for re- and up-skilling aimed at vulnerable groups, measures to educate students and unemployed persons to strengthen knowledge and skills in tourism, and by funding a voucher system that will cover training for improving digital skills.

2. Context for (rural) digitalisation

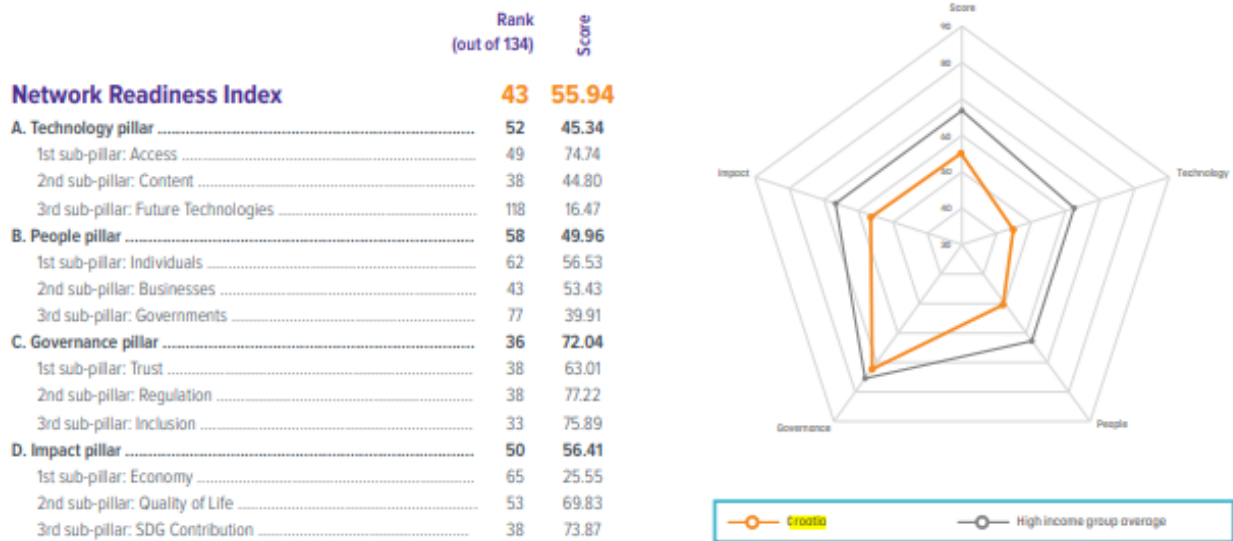
2.1. Current context for digitalisation

Network Readiness Index (NRI)

Croatia ranks 43th out of the 134 economies included in the NRI 2020¹⁴ one position up (44th) from NRI 2019. Croatia meet the EU high income group average only in Governance pillar in other three pillars Croatia is below EU average. In Technological pillar is well below and in People pillar situation is only slightly better, still all that shows that there is much work for Croatia in period ahead.

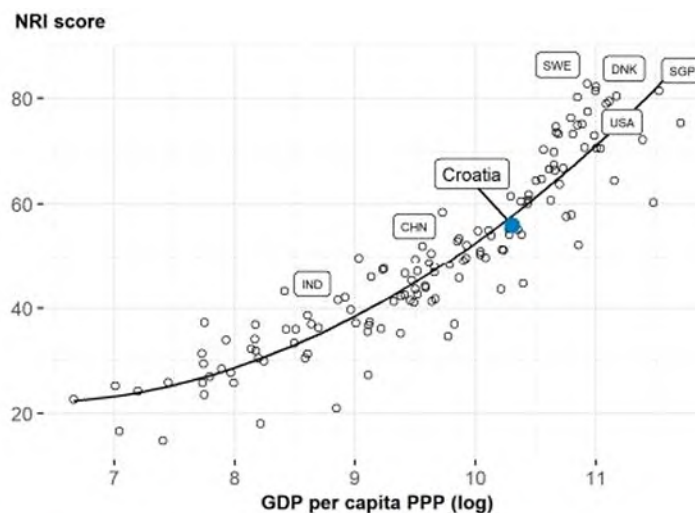
Strongest indicators rank: e-commerce legislation 1, Privacy protection by law content 6, Rural gap in use of digital payments 6. And the weakest indicators rank: Investment in emerging technologies 107, Government promotion of investment in emerging technologies 106, Prevalence of gig economy 103.

¹⁴ The Network Readiness Index 2020, 'Accelerating Digital Transformation in a post-Covid Global Economy'

Figure 1.


NRI score and income

Figure 1. shows the position of Croatia in terms of both NRI score and GDP per capita (PPP). The trend line shows the expected NRI score given an economy's income level. As can be seen, Croatia is slightly below the trend line, which suggests that its network readiness is more or less in line with what would be expected given its income level.

Figure 2: NRI score and GDP per capita PPP (log)


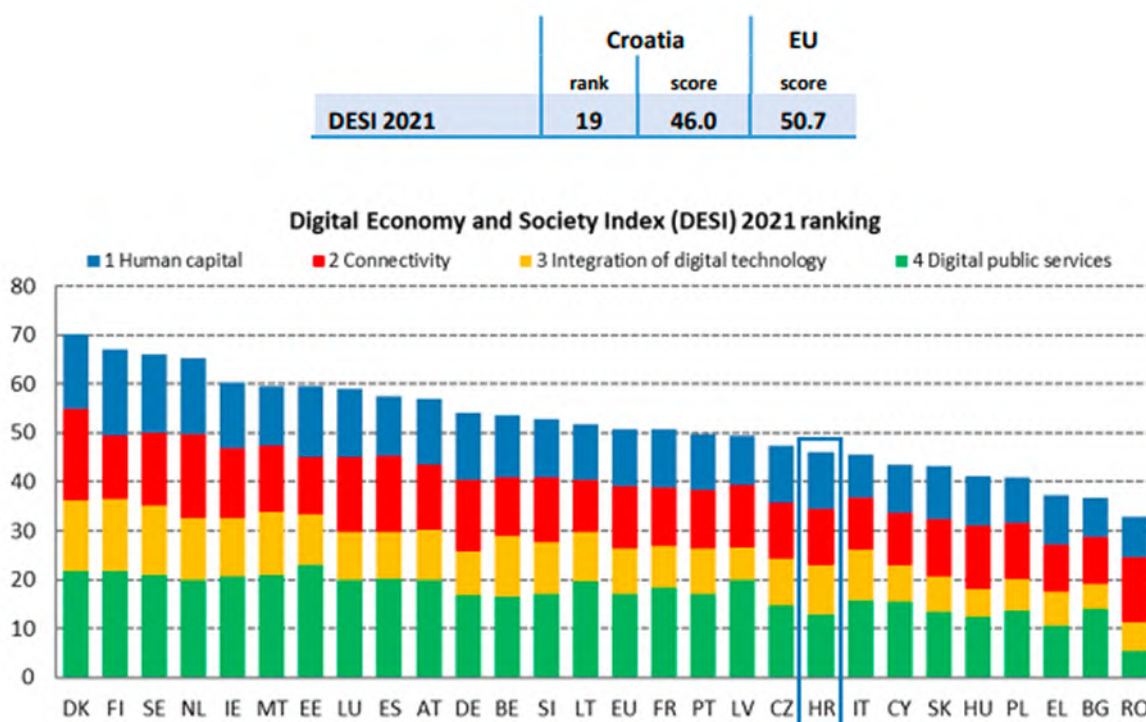
Note: SWE = Sweden (rank: 1), DNK = Denmark (2), SGP = Singapore (3), CHN = China (40), IND = India (88). USA is ranked 8th. Croatia belongs to the group of high-income countries, where the best performer is Sweden (SWE). The top performer of its region-Europe-is also Sweden (SWE).

Digital Economy and Society Index (DESI)

Concerning the **Digital Economy and Society Index (DESI)** in 2020, Croatia ranks 19th out of 27 EU Member States (see fig. 1)¹⁵. Compared with the two previous years 2020. And 2019 Croatia was 20th.

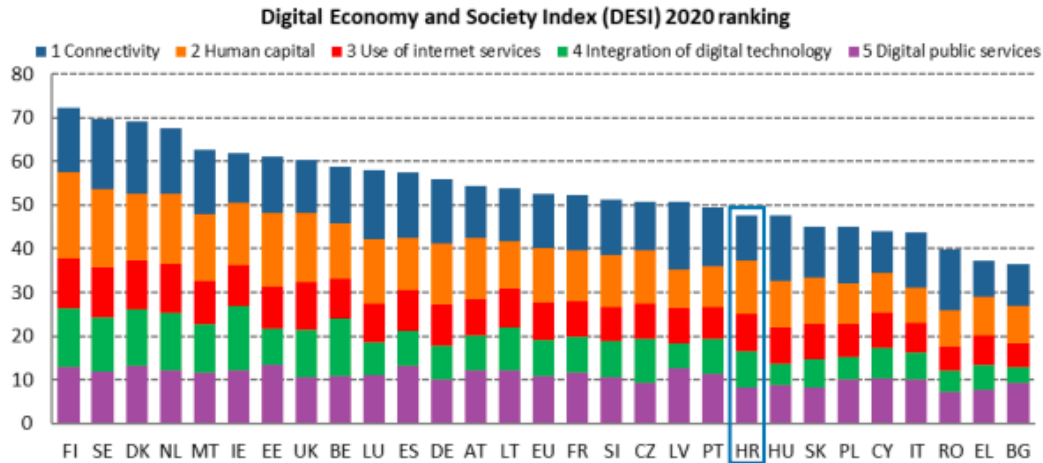
While Croatia has good fast broadband coverage (86% national and 39% rural), its overall fixed broadband take-up is slightly below the EU average. One of the positive developments in connectivity is the assignment of harmonised spectrum for 5G in August 2021. This is a stepping stone for further acceleration of the digital transformation and is bringing benefits to both businesses and individuals. The level of at least basic digital skills remains slightly low compared with the EU average. In contrast, for above basic digital skills, Croatia comes in above the EU average.

Figure 3.



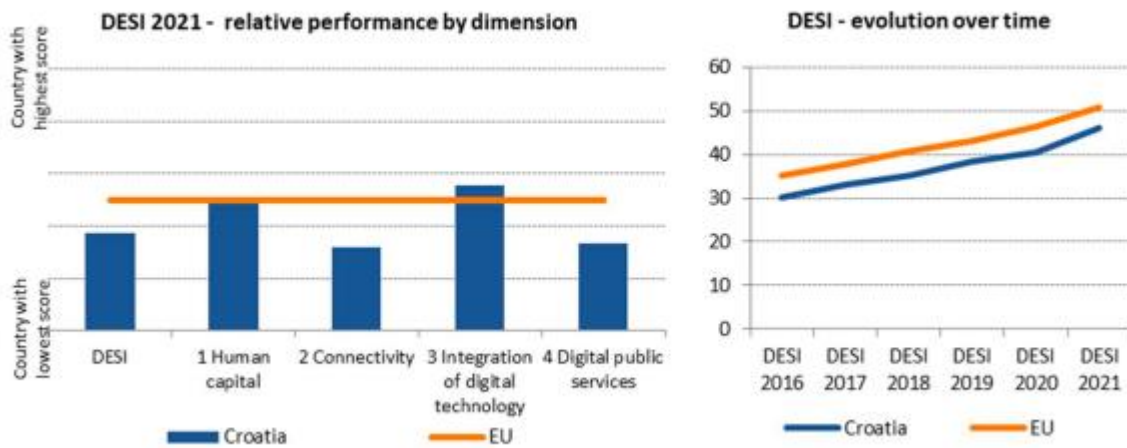
¹⁵ https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=66916

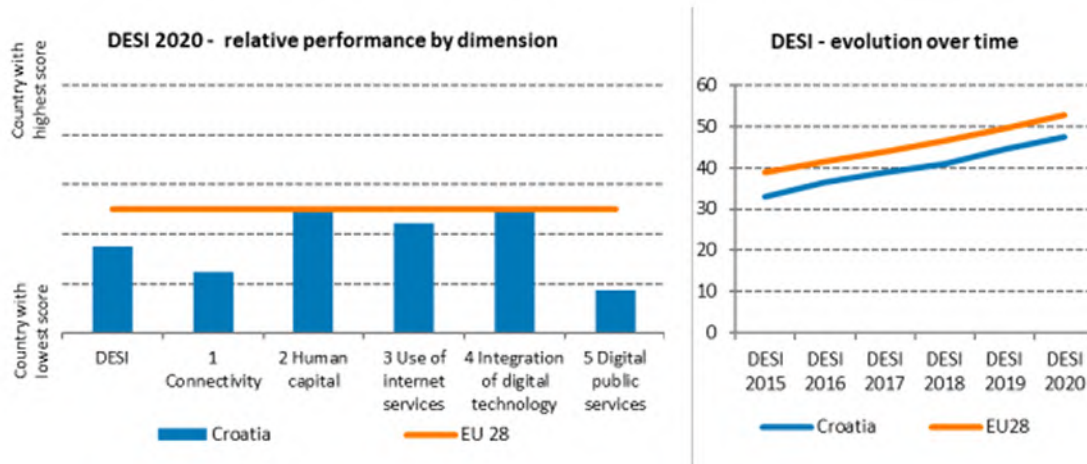
	Croatia		EU
	rank	score	score
DESI 2020	20	47.6	52.6
DESI 2019	20	44.3	49.4
DESI 2018	21	40.8	46.5



The following section takes a closer look at the DESI dimensions connectivity, human capital, use of internet services, integration of digital technology, and digital public services.

Figure 4.

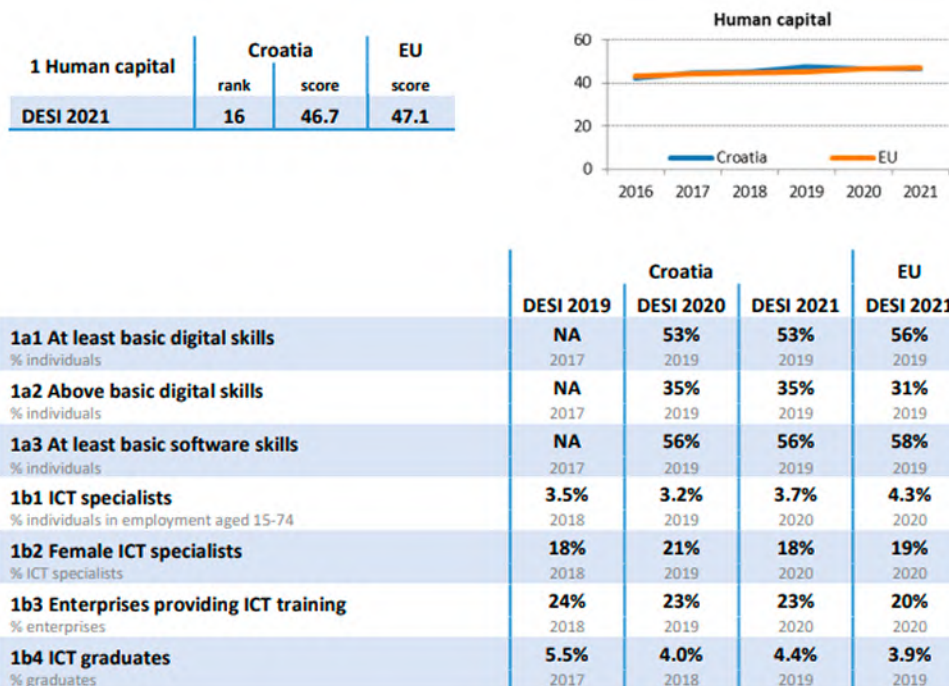




1. Human capital

Croatia ranks 16th of 27 EU countries. Levels of at least basic digital skills remain low compared to the EU average, with only 53% of people between 16 and 74 years having at least basic digital skills. In the 16-24 age group, however, basic and above-basic digital skills are the highest in Europe. In addition, for above-basic digital skills, Croatia comes in above the EU average (35%, against an EU average of 31%). As regards basic software skills, Croatia scores only 2 percentage points less (56%) than the EU average (58%). ICT specialists account for a lower percentage of the workforce in Croatia than the EU average (3.7%, EU average: 4.3%). The percentage of female ICT specialists is slightly below the EU average. Conversely, Croatian enterprises are investing in ICT training for employees, with 23% of enterprises offering specialised ICT training.

Figure 5.



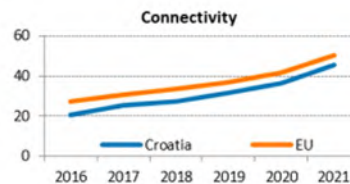
2 Human capital	Croatia		EU
	rank	score	score
DESI 2020	13	49.2	49.3
DESI 2019	14	46.8	47.9
DESI 2018	13	45.8	47.6

2. Connectivity

Croatia ranks only 20th in Connectivity. It features good fast broadband coverage (86% national and 39% rural). In contrast, the overall fixed broadband take-up is slightly below the EU average, standing at 73% in 2020. The prevailing technology remains xDSL. Fixed very high-capacity networks (VHCN) coverage (47% national and 11% rural) is below the EU average (59%) but steadily increasing. This is partly due to increasing coverage of fibre to the premises, standing at 36% in 2020 (7% rural) and the recent partial upgrade of cable networks to DOCSIS 3.1 (34%). Despite access to very high broadband speeds, the uptake of at least 100 Mbps broadband is low (9%), although it has increased by 3 pp. compared to 2019. There has not been any uptake of 1 Gbps services so far. Broadband prices are higher (price index of 60) than the EU average. On mobile, its strong point is the near-complete 4G coverage and the take-up of mobile broadband, which stands at the EU level (71%). Croatia has assigned all 5G spectrum in the pioneer bands (5G readiness reached 100%), but still lacks 5G coverage completely.

Figure 6.

2 Connectivity	Croatia		EU
	rank	score	score
DESI 2021	20	45.4	50.2



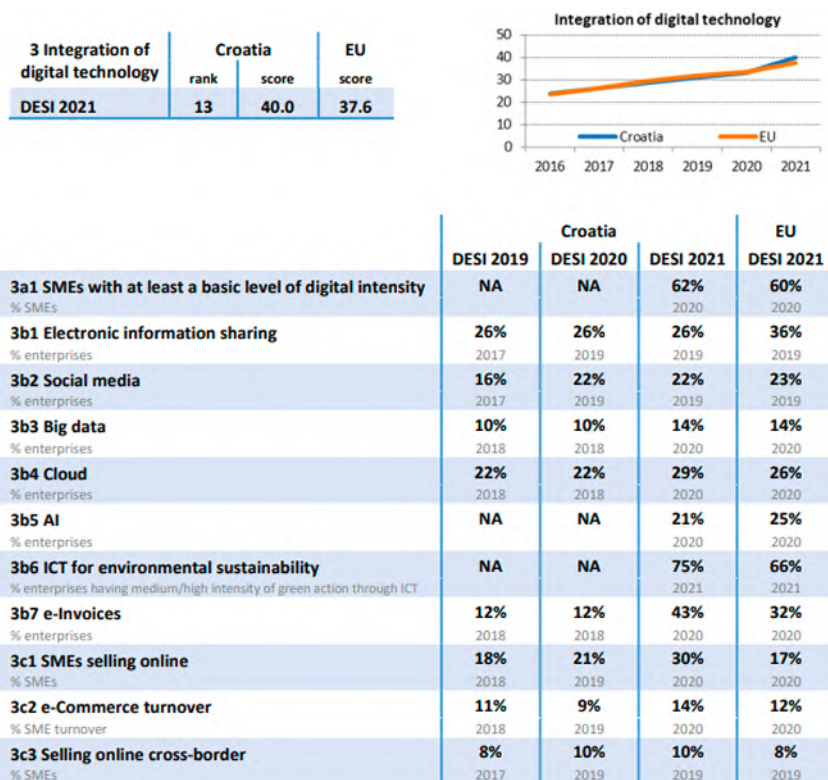
	Croatia			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
2a1 Overall fixed broadband take-up	72%	70%	73%	77%
% households	2018	2019	2020	2020
2a2 At least 100 Mbps fixed broadband take-up	5%	6%	9%	34%
% households	2018	2019	2020	2020
2a3 At least 1 Gbps take-up	NA	<0.01%	<0.01%	1.3%
% households		2019	2020	2020
2b1 Fast broadband (NGA) coverage	83%	86%	86%	87%
% households	2018	2019	2020	2020
2b2 Fixed Very High Capacity Network (VHCN) coverage	23%	43%	47%	59%
% households	2018	2019	2020	2020
2c1 4G coverage	97.6%	99.3%	99.5%	99.7%
% populated areas	2018	2019	2020	2020
2c2 5G readiness	0%	0%	100%	51%
Assigned spectrum as a % of total harmonised 5G spectrum	2019	2020	2021	2021
2c3 5G coverage	NA	NA	0%	14%
% populated areas			2020	2020
2c4 Mobile broadband take-up	62%	71%	71%	71%
% individuals	2018	2019	2019	2019
2d1 Broadband price index	NA	61	60	69
Score (0-100)		2019	2020	2020

1 Connectivity	Croatia		EU
	rank	score	score
DESI 2020	25	41.2	50.1
DESI 2019	25	37.2	44.7
DESI 2018	26	32.1	39.9

3. Integration of digital technology

On the Integration of digital technology, Croatia ranks 13th among EU countries. 62% of Croatian SMEs have at least a basic level of digital intensity, slightly above the EU average of 60%. As for the use of ICT for environmental sustainability, 75% of Croatian enterprises record medium/high intensity of green action through ICT, significantly higher than the EU average of 66%. Croatian enterprises are taking advantage of the opportunities offered by digital technologies. They actively participate in online commerce, with 30% of SMEs selling online and 10% selling across borders to other EU countries. Advanced technologies are becoming more popular among Croatian enterprises, with 29% using cloud solutions and 21% using AI solutions. Every fifth (22%) enterprise actively uses social media, while one in four (26%) share information electronically. Croatia has experienced a boom in e-invoices, with a record increase of enterprises using them, up from 12% in 2018 to 43% in 2020. The uptake of big data analysis is also increasing, reaching the EU average of 14% of enterprises.

Figure 7.



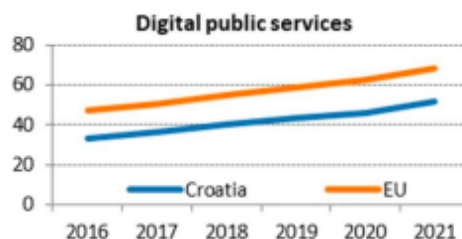
4 Integration of digital technology	Croatia		EU
	rank	score	score
DESI 2019	18	38.6	41.1
DESI 2018	18	36.9	39.6
DESI 2017	17	35.9	37.6

4. Digital public services

Croatia ranks 24th among EU countries and is still underperforming in this dimension of the Digital Economy and Society Index. It has a below-average level of online interaction between public authorities and members of the public, with 52% of internet users using e-government services (EU average: 64%). For the indicator measuring the amount of data pre-filled in public service online forms, Croatia scores far below the EU average (score of 43; EU average: 63). Croatia is also below the EU average on the availability of digital online services, both on digital services for citizens (score of 60; EU average: 75) and for businesses (score of 73; EU average: 84). In contrast, on open data Croatia performs well.

Figure 8.

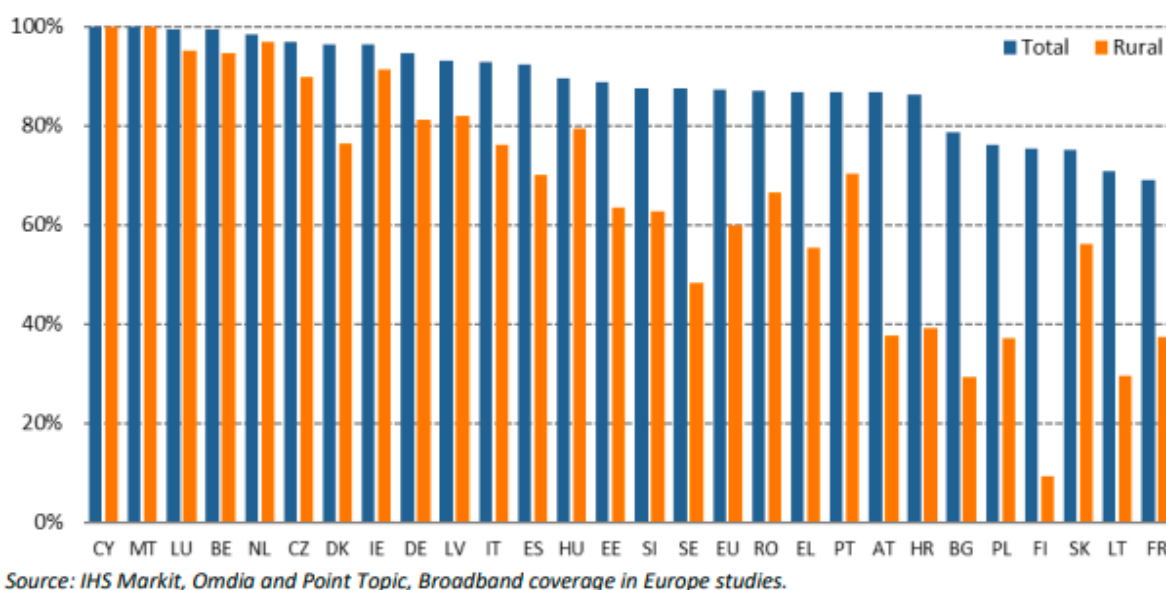
4 Digital public services	Croatia		EU
	rank	score	score
DESI 2021	24	52.0	68.1



	Croatia		EU	
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
4a1 e-Government users % internet users	48%	41%	52%	64%
4a2 Pre-filled forms Score (0 to 100)	NA	NA	43	63
4a3 Digital public services for citizens Score (0 to 100)	NA	NA	60	75
4a4 Digital public services for businesses Score (0 to 100)	NA	NA	73	84
4a5 Open data % maximum score	NA	NA	82%	78%

4 Integration of digital technology	Croatia		EU
	rank	score	score
DESI 2019	18	38.6	41.1
DESI 2018	18	36.9	39.6
DESI 2017	17	35.9	37.6

Figure 9. Next generation access (NGA) broadband coverage in the EU (% of households), mid-2020

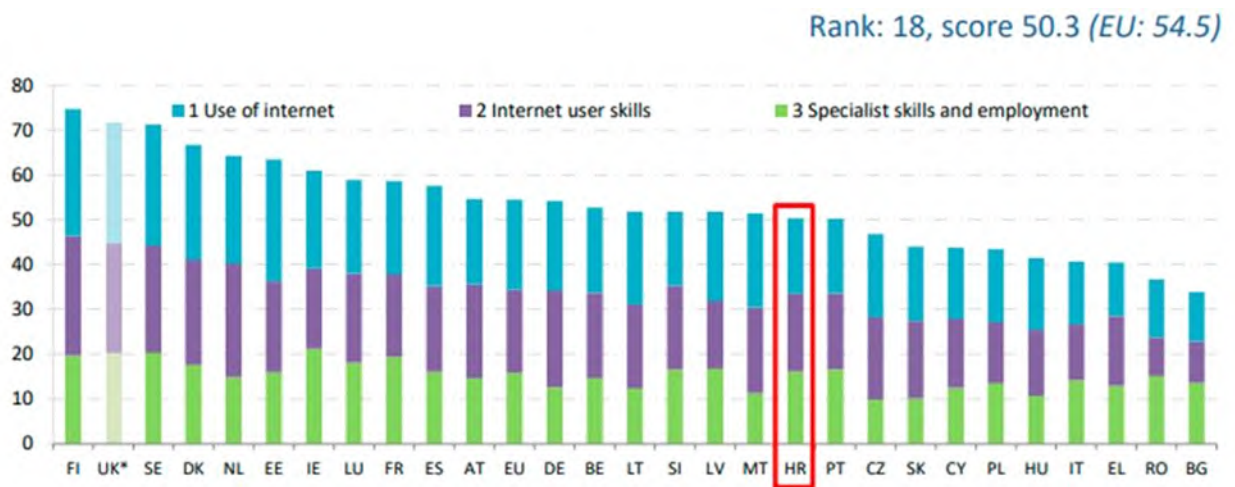


- **The Women in Digital Scoreboard 2021.**

Croatia ranks 18th with a score of 54.4 in the Women in Digital Scoreboard 2021 ranking and is thus very slightly below the EU average (score 54.5). The highest ranking in the subcategories is achieved in "STEM graduates" with 7th place. It is interesting to note that women STEM graduates are still 50% of those of man.¹⁶

¹⁶ <https://ec.europa.eu/newsroom/dae/redirection/document/80470>

Figure 10.



Croatia

	Croatia		EU	
	Women value	Men rank	Women value	Men value
1 Use of internet				
1.1 Internet users	74%	26	81%	87%
% individuals, 2020				
1.2 People who have never used the internet	21%	25	13%	8%
% individuals, 2020				
1.3 Online banking	63%	18	65%	67%
% internet users, 2020				
1.4 Doing an online course	14%	18	15%	15%
% internet users, 2020				
1.5 Online consultations or voting	13%	10	13%	12%
% internet users, 2019				
1.6 e-Government users	46%	24	57%	64%
% internet users submitting forms, 2020				
1 Use of internet	50	22	60	
Score (0-100)				
2 Internet user skills				
2.1 At least basic digital skills	50%	18	57%	58%
% individuals, 2019				
2.2 Above basic digital skills	33%	11	38%	33%
% individuals, 2019				
2.3 At least basic software skills	52%	20	60%	60%
% individuals, 2019				
2 Internet user skills	52	17	53	
Score (0-100)				
3 Specialist skills and employment				
3.1 STEM graduates	15	7	24.4	28
Per 1000 individuals aged 20-29, 2019				
3.2 ICT specialists	1.5%	18	5.7%	6.5%
% total employment, 2020				
3.3 Unadjusted gender pay gap	13%	4	19%	
% difference in pay, 2019				
3 Specialist skills and employment	53	8	47	
Score (0-100)				
Women in Digital Index	51.8	17	53.2	
Score (0-100)				

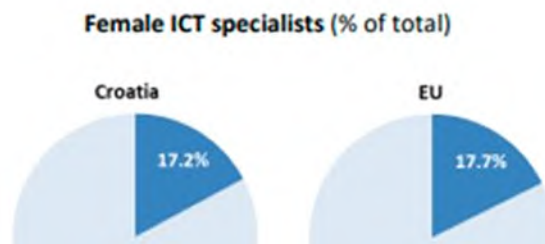
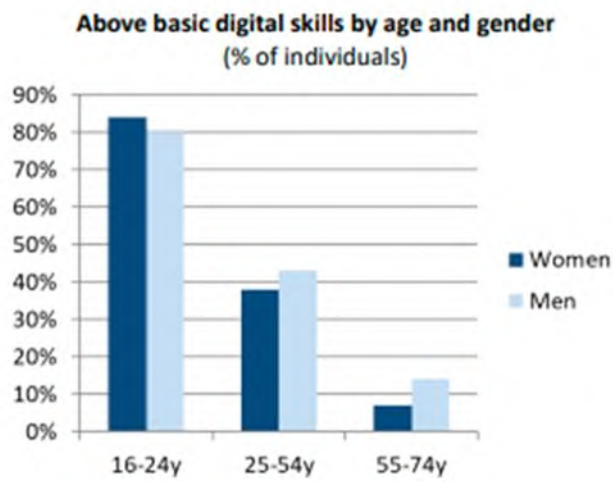
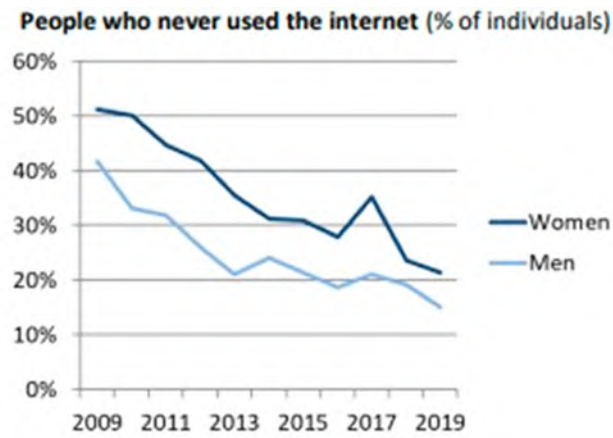
Fig. 11: Croatian ranking in the Women in Digital Scoreboard 2021 (Women in Digital Scoreboard 2021)

Notes: *As the figures refer to 2019, the United Kingdom is still included in index and EU averages are calculated for 28 Member States

Unadjusted gender pay gap: EU average estimated based on Eurostat data.

Data source: Eurostat

Figure 12.



3. Policy framework for (rural) digitalisation

3.1. European Digital Policies

As part of the **National Development Strategy of the Republic of Croatia by 2030**, which continues and improves the policy of the development strategy until 2020, Strategic Objective 12 “Development of assisted areas and areas with development peculiarities”.

For a country the size of Croatia, significant internal differences in the level of development are not only an obstacle to realisation of local economic and living opportunities, but also limit the overall national productivity and efficiency. Therefore, investments in balanced regional development, in order every part of Croatia has become better and more desirable for life, an indispensable component of sustainable and sustainable growth, demographic recovery, strengthening social justice and social trust.

The main development issues of less developed areas in Croatia are unfavourable economic structure characterised by a weak role of the private sector and a large presence public sector, underdeveloped human capital, low culture of entrepreneurship, insufficient effective institutions, depopulation, emigration and population aging. In addition, islands and mountainous areas face their own specific challenges arising from insufficient transport connections and seasonal sustainability of infrastructure. In many cases, they are fundamental the causes of underdevelopment and depopulation of the population are directly related to the suffering of war, great loss of population and the amount of damage caused during the Homeland War.

The most prominent example is the City of Vukovar, which suffered great human losses and terrible in the war devastation of its public and business infrastructure. European funds are a source of funding that combined with effective horizontal policies and regional development policy has the potential and power to significantly reduce large internal differences in development. Therefore, they will be a significant support until 2030 development of assisted areas and areas with developmental peculiarities (hilly and mountainous areas and islands) in Croatia with the aim of their demographic revitalisation, sustainable development and economic regeneration of the tourism sector, the food production and processing sector and production and wood processing and reducing social inequality and poverty and creating better living conditions and business. Due to the special geopolitical position of border areas and their importance for Croatia, and considering their specific development difficulties and limitations, it is necessary take extra care of them.

Priority policy areas for strategic objective 12.**"Development of assisted areas and areas with development specifics"****1. Development of assisted and mountainous areas**

Smart resource management, more efficient connectivity and mobility, development communal, entrepreneurial, transport and social infrastructure and related services, and by developing the concept of smart villages and encouraging the development of the local economy will be reduced depopulation processes and encourage socio-economic development of assisted and mountainous areas. An integrated and shared approach to investment will play a key role development initiatives of several local self-government units, while maintaining the central role small towns that are considered generators of development in areas particularly affected negative demographic and economic trends.

Special attention will be paid to investments in local transport infrastructure and in broadband internet. Better connectivity will contribute to the unification of economic, social, educational and social opportunities of the urban and rural population, while improving connections between centres of gravity allow easier access to international one's markets and involvement in global value chains and provide an opportunity for digital development economy and bioeconomy.

Measures and models of housing care that include ensuring permanent and adequate accommodation, primarily for young families and professional and educational staff, will stop emigration of the population from the assisted areas and encourage additional settlement Priority areas of public policy 12. Development assisted areas and areas with developmental peculiarities 1. Development of assisted and mountainous areas 2. Development of smart and sustainable islands STRATEGIC GOAL NDS 2030 The difference in regional GDP per capita (GDP ratio per capita of ZG (most developed county) in relation to VPŽ (least developed county) Performance Indicator 3.1 (2017) 2.5 INITIAL VALUE TARGET VALUE 2030. 128 assisted and island areas. It is necessary to continuously implement housing policy care with local self-government units and with competent bodies and state institutions administration.

Access to social services important for reducing the risk of poverty will also be provided limiting inequalities arising from differences in the development of individual areas, in addition equalising the availability of social and health services and harmonising their structure with demographic and social characteristics of the population. Investments will also be made in the integration of the population faced with the risk of poverty and exclusion living in urban centres works ensuring a decent standard of living.

The implementation of the Slavonia, Baranja and Srijem project will continue, which will be extended to the whole Pannonian Croatia in order to increase investment in infrastructure, human capital and competitiveness extremely important part of Croatia in order to reflect the real economic dynamism of the area its potentials and thus created living conditions that would encourage emigrated Croats to

return to the homeland. Relying on the experience gained in the implementation of this project, it will launch similar activities aimed at faster development of the Dalmatian hinterland, Lika, Banovina and Gorski districts and will encourage the development of islands, northern Croatia and other areas to enable balanced development of Croatia.

Special attention will be paid to the areas of Banovina that were severely damaged in the 2020 earthquake. Through special programs for the renewal and urgent rehabilitation of public infrastructure, private and business facilities and public buildings will provide strong support to these areas for what faster recovery and providing the population of the affected area with conditions for quality of life and the rest.

Policy implementation priorities in the field of assisted and mountainous development areas:

- demographic revitalisation of deprived areas
- economic regeneration of deprived areas
- smart resource management
- connectivity and mobility
- improving the quality of life by developing public infrastructure (utilities, transport, business and social), by supporting housing construction and developing public services
- rehabilitation of the consequences of devastating earthquakes and reconstruction of the affected areas
- development and construction of broadband infrastructure and electronic communication networks very large capacity
- development of smart villages.

2. Development of smart and sustainable islands

A better connection of the islands with the centres of economic dynamism is inevitable the premise of maintaining and reviving life, but also a better connection of the island with the international markets. The development of smart and sustainable islands will be based on an integrated approach to development and digitisation of island resources and their sustainable management, while respecting their specificities in terms of transport, energy, safety and risk prevention and accessibility infrastructure and public services, considering the potential for economic growth and development of the island.

Integrated passenger transport will be encouraged, considering the connectivity of isolated areas to mainland, the connection of islands to the mainland, inter-island connectivity and the need to reduce congestion large traffic centres (eg Split) at the time of the greatest tourist activity.

Structural changes to island economies will strengthen the island's capacity and capacity to implementation of innovative solutions. This will address the key societal challenges in the area climate change and environmental protection, clean energy and transport, and health and quality of life. How to further revitalise island economies and island life, emphasis will be placed on digital economy, tourism, availability of public services to all islanders, renewable energy sources, fisheries and food production and processing. In order to create the preconditions for successful digitisation and the digital transformation of island communities will support investment in digital development infrastructure that will provide ultra-fast broadband Internet access to islanders' community. The strategic connection of the island with entrepreneurs and the university community will open up the way to design and implement sustainable solutions to specific island problems, including the concept of "smart islands".

Policy implementation priorities in the field of smart and sustainable islands development:

- smart and sustainable management of island resources and the environment, combating climate change
- change and risk prevention
- sustainable development and structural transformation of the island's economy
- smart mobility and connectivity
- development and construction of submarine-terrestrial fibre optic broadband infrastructure and access electronic communications networks of very large capacity
- improving the quality of life by developing public infrastructure (utilities, water, transport, business and social), support for housing and the development of public services

Financial framework for the implementation of the NDS 2030

The financial framework for the implementation of this Strategy is contained in the state budget and all sources financing that are consolidated in the state budget and budgets that form an integral part general government budget.

The availability of financial resources and the order of implementation of strategic interventions will shortly be defined by four - year implementation programs at national, regional and local level and determined by the consequences of the current crisis on the dynamics of budget collection income. Given the expected depth of the crisis and the magnitude of the uncertainty, this is reasonable and justified access. However, how the dynamics of recovery will determine the dynamics of budget recovery revenue, an effective balance between macroeconomic and structural measures to increase productivity, competitiveness and innovation will be a key component of strengthening financial framework for the implementation of the Strategy.

With national funds and the activation of private capital receipts from European funds on the basis financial allocations in the financial perspective 2014-2020, as well as those defined in the new one financial perspective of the European Union 2021-2027, form an integral part of the budgetary

potential to fund the priorities of this Strategy. Given the size of the Croatian economies are high assets that have significant development potential.

Croatia will help the countries' economic recovery from a 750 billion-euro package Member States and through the amended multiannual financial framework, ie the budget of the European Union for period 2021-2027, have more than 23.5 billion euros at its disposal (which is over 40% annual GDP of Croatia), which is a strong stimulus for economic growth and development. From that part of the funds will relate to the Instrument of the Next Generation of the EU Recovery and Resilience Plan, which will finance support for employees, small and medium enterprises, digital and green transformation and support for sectors in need, from tourism to culture. More than 30% of funds from recovery and resilience plan will need to be invested in low-carbon development to achieve climate change neutrality and increasing resilience to climate change, and about 20% to the digital transition. Through a key recovery instrument, the European Recovery and Resilience Mechanism (Recovery and Resilience Facility), Croatia will provide large financial support to public investment and reforms to strengthen the resilience of the economy, boost employment, develop skills, education, research, development and innovation, and strengthening the health system, public administration and financial sector.

Investments in these areas will be aligned with the multi-annual strategic objectives aimed at promoting economic, social and territorial cohesion and convergence by supporting green and digital transitions in restoring economic potential.

Another important element of the financial envelope available to Croatia is the funds from the Multiannual the financial framework for the period 2021-2027 in the funds of the regional policy of the European Union, but also rural development, agriculture and fisheries, and security and migration funds. They will to finance Croatia's development needs even more intensively and to invest in strategic goals such as recognizable, competitive, innovative and digital economy and society, green and digital transition and balanced regional development. These funds will also be directed to strengthening competence of state and public administration and efficiency of the judiciary, in education, demographic renewal, healthy, active and quality life, development of agriculture and preservation of cultural heritage.

Education and health and social services development programs will be funded for all, with particular emphasis on rural and island areas and areas inhabited by national minorities and the establishment of regional centres for the development of robotics and creative industries such as video game industry, and integrated youth centres will be established in each county. It will continue with the provision of scholarships for students of lower financial status. Financially it will support the development of clean technologies and industries that are focused on the circular economy, especially those that contribute to the implementation of the order of priority waste management (waste prevention, preparation for re-use, recycling, recovery and reuse), to build a low-carbon society, and will continue to finance environmental and water-communal infrastructure. In addition, others will benefit opportunities available to Croatia to mitigate the effects of global health crisis, such as the € 100 billion SUREA instrument for European Union countries. Loans from this instrument will be used to preserve jobs and maintain employment.

Projects at local and regional level will be supported while maintaining the current rate level national co-financing of projects from European funds of 15% and their beneficiaries ensure smooth funding. In doing so, the financial capacity of the individual will be considered units in order to enable the largest possible co-financing from state funds to units that are funds from the state budget necessary to finance European projects, in accordance with criteria prescribed by the Government and the possibilities of the state budget. To speed up implementation of European funds, procedures will be simplified and digitised and a system will be established to manage European funds tailored to users.

3.2. National Policies boosting digitalisation

3.2.1. National Digital Agenda or similar strategies

While Croatia is making modest progress to reach the Gigabit Society objectives, significant improvements are still needed. High right-of way fees are an impediment to VHCN deployment. Efficient VHCN deployment could be further facilitated by absorption of EU funds, implementation of the connectivity toolbox and addressing the lack of coordination in permit granting between central and local government, in particular on permit granting and fees. The recent assignment of harmonised spectrum suitable for 5G usage is an important step towards digital transformation, enabling Croatia to take full advantage of a digitalised economy and society, both for households and businesses.

National Plan for the Digital Transformation of the Economy 2021-2027 the plan is a strategic planning act supporting the overall implementation of the digital measures under Croatia's **2021-2030 National Development Strategy**.

The 2021-2029 Smart Specialisation Strategy and the **National Plan for the Development of Artificial Intelligence** are also under development. Both programmes aim to support the repositioning of Croatian enterprises in global value chains via the development of digital business models and digital skills to adapt their organisational structures to the new global challenges. The Cybersecurity Act is expected to be in force by the end of 2021, and it is a response to European initiative establishing the Network of National Coordination Centres (NCCs) guided by the European Cybersecurity Competence Centre (ECCC). Croatia's 2020 National Reform Programme includes support from the European Regional Development Fund (ERDF) to set up a European Centre for Innovation, Advanced Technologies and Skills Development (ECINTV). ECINTV will be a one-stop shop providing support for the digital transformation of the economy, by promoting lifelong learning for the development of digital and entrepreneurial skills and access to the latest knowledge and resources for testing and experimenting with advanced technologies. It will also facilitate access to digital solutions and provide networking to strengthen the national innovation ecosystem.

The Croatian Association for Artificial Intelligence (CroAI) , founded in 2019, gathers more than 170 members consisting of Croatian AI enterprises, start-ups, scale-ups, universities and AI enthusiasts

with a view to connecting leading enterprises and start-ups in the field of artificial intelligence in Croatia.

The Centre for Artificial Intelligence and Cybersecurity (AIRI) at the University of Rijeka connects scientists from various fields working on interdisciplinary research projects. The Regional Centre of Excellence for Robotics (CRTA) works as a reference centre for research, development and educational activities on robotics and AI. CRTA focuses on the research and development of advanced robot applications, especially in industry and medicine, and where traditional automation and human work can be replaced with adaptive and intelligent systems. ICENT and University of Zagreb Faculty of Electrical Engineering and Computing - ICENT has its roots in the University of Zagreb Faculty of Electrical Engineering and Computing (FER) and is established with the aim of creating a third dimension – innovations based on scientific research. Partnership between ICENT and FER creates a powerful driver that activates the academic and research community for the benefit of the development of the Croatian economy and society.

To continue boosting the digital transformation of the Croatian economy, it is important to support SMEs in raising the uptake of advanced technologies, paying particular attention to start-up ecosystems, businesses in disadvantaged regions and female digital entrepreneurs. This will require a coordinated and comprehensive approach combining incentives, investments, and simultaneously building strong links with the relevant investments in human capital. Ensuring that employees are well equipped with relevant advanced digital skills will enhance the innovation capacity of SMEs. The development of a comprehensive digital strategy for the collection, analysis and exploitation of data across several public and private domains would help to address weaknesses and reinforce strengths in the fields of security, privacy, products and services innovation, both in the private and public domains, and contribute to relevant EU initiatives (for example the 1 Million Genomes Declaration).

Digital in Croatia's Recovery and Resilience Plan (RRP)

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

- Economy component: this includes several investments supporting the digital transition for a total of EUR 576 million, with the largest investments in the digitalisation of transport (EUR 281 million) and energy (EUR 155 million), and the digitalisation of culture and creative industries (EUR 40 million). Other investments in digitalisation are planned in tourism, agriculture, smart working, government services and public infrastructure, and there are plans for grants/vouchers for digitalisation.
- Public administration, judiciary and state assets component: total investment for this component is EUR 437 million, with EUR 158 million dedicated to connectivity.

- Education, science and research component: this includes digital investments of EUR 158 million, including substantial measures for the digital transformation of higher education (EUR 84 million) and the digitalisation of research and innovation activities in universities and research centres.
- Labour market and social protection component: a total digital investment of about EUR 57 million is planned, mostly for the development of digital skills to facilitate the digital transition of the labour market (EUR 44 million).
- Healthcare component: this includes a substantial investment (about EUR 44 million) in telemedicine, with the largest investment earmarked for the digitalisation of the National Oncology Network and a national oncology database, plus EUR 8 million on digitalisation of operating theatres. Other smaller measures focus on e-care, teletransfusion, robotic surgery and digitalisation of diagnostic units.
- Buildings renovation initiative: this features a digital investment of EUR 13 million to strengthen capacity to monitor seismic phenomena, plus other smaller measures for the digitalisation of buildings restoration, the planning of future constructions and the setting up of an energy management system.

Main market & regulatory developments

The Croatian fixed and mobile markets remain stable, with the incumbent, Hrvatski Telekom holding almost 73% of the fixed broadband market and almost 46% of the mobile market. Its main competitor is A1, with market shares of almost 29% and 35% respectively. Tele2, which changed its brand name to Telemach in November 2020, holds 19.4% of the mobile market and has also announced its entry into the fixed market.

Since 2014, in the context of an insolvency procedure, the incumbent has had a time-limited right of control over Optima Telekom and had to initiate the sale of its shares in the company and the transfer of its control in January 2020. This was an opportunity for new entry in the Croatian market, which could contribute to increased competition and additional benefits for end users in terms of more options, better service and lower prices. However, even after extending the deadline for bids during 2020 there were not any valid offers. Optima therefore still remains with Hrvatski Telekom.

While dual play bundles dominated the market in previous years, these have considerably decreased in 2020. In contrast, triple play remained stable and quadruple play offers are increasing. On the mobile market, post-paid subscriptions are more popular and are slowly increasing (56.7% in 2020), while pre-paid subscriptions are decreasing (43.3% in 2020). TV service is one of the main drivers for subscribing to bundled offers and is included in 71% of all subscriptions. Consumption of over-the-top services is expected to increase, to the detriment of SMS traffic, in particular, decreased by 17% in 2020. On the other hand, traditional mobile voice traffic has increased by 17%, most likely as an effect of the COVID-19 pandemic and the increase in remote and home working.

The main developments in market regulation are the decisions on: (i) market analysis of the market for wholesale high-quality access provided at a fixed location (market 4 of the 2014 Recommendation¹⁷; and (ii) on the market for wholesale trunk segments of high-quality access provided at fixed location (previous market 14 of the 2003 Recommendation¹⁸), both notified in July 2020.

On 4 February 2021, the Commission sent a letter of formal notice to Croatia for failure to notify transposition measures for the European Electronic Communications Code. Subsequently, Croatia provided notification that the transposition is planned for Q3 2021. In a country with over 550 local authorities, excessive right-of-way fees paid to the local municipalities remain a problem for private infrastructure owners. Furthermore, stringent local planning regimes remain another obstacle to efficient roll-out of both fixed and mobile infrastructure. In its roadmap to implement the Connectivity Toolbox¹⁹, Croatia announced plans to address the main obstacles to efficient VHCN deployment, such as planning restrictions, faster procedures to rights of way, and the need to establish a coordination body for permit handling and draw up guidelines for application of fees.

In 2020, consumer complaints remained stable (872 complaints) compared to the year before (879), with the bulk of complaints concerning bills, contractual terms and quality of service. Although there was a general increase in both fixed and mobile traffic, which were consistently monitored, no significant congestion issues occurred

Human Capital in Croatia's Recovery and Resilience Plan

The Recovery and Resilience Plan includes investments to support the development of digital skills. The plan includes the continuation of the reform of the education system to improve the basic skills of pupils through increased instruction time and strengthen the link between vocational and adult education and the labour market. The development of new curricula, which will include a focus on the digital transition, is also planned. Alongside, Croatia launches dedicated measures to boost employment, develop skills for the labour market and strengthen pension and welfare systems, with further efforts to combat poverty and social exclusion. The measures are expected to increase the employment rate, improve quality of life and strengthen social cohesion, especially for young people and the self-employed. Fostering lifelong learning and upskilling of workers through investments to adapt to labour market needs will contribute to the employability of all generations. A system or model for reskilling/upskilling will also be developed in line with the needs of the economy and through the proactive role of the Croatian Employment Service (CES). Skills acquisition is also partially addressed in other areas of the plan for example by implementing a voucher system for re- and upskilling aimed at vulnerable groups, measures to educate students and unemployed persons to

¹⁷ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014H0710>.

¹⁸ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32003H0311>.

¹⁹ <https://digital-strategy.ec.europa.eu/en/policies/connectivity-toolbox>.

strengthen knowledge and skills in tourism, and by funding a voucher system that will cover training for improving digital skills.

Connectivity in Croatia's Recovery and Resilience Plan

The Croatian plan includes two main connectivity measures to strengthen connectivity as a cornerstone of the digital transition of society and the economy. The first measure, worth around EUR 106 million, aims to provide VHCN connectivity services in line with the EU gigabit ambition objective by 2025:

- 100 Mbps services to 100,000 Croatian households (700,000 inhabitants) in 20 projects in as many local government units, to overcome in particular the connectivity barrier to teleworking and distance learning, especially in rural areas and among vulnerable groups such as students from disadvantaged families or those with disabilities;
- 1 Gbit services to all major socio-economic drivers such as schools, universities, research centres, transport hubs, hospitals, public administrative authorities and businesses.

Other investments of about EUR 20 million will target: (i) building passive electronic communications infrastructure to provide access to VHCN and 5G services in rural and sparsely populated areas where there are no the market conditions to attract private investment'; and (ii) 5G coverage in urban areas and the main terrestrial transport routes (5G corridors). About 55% of the households covered by these measures are in rural areas, 26% are in suburban areas, and only 19% in urban areas. About EUR 400,000 will be invested in four reform activities on:

- analysis and identification of administrative burdens on spatial planning and construction and permit granting
- developing guidelines for removing administrative burdens drawing on examples of good practice in EU countries
- developing guidelines for the development of spatial plans, focusing on the conditions and method of planning of electronic communications
- developing guidelines for the harmonisation of procedures for obtaining building documents based on good practice in EU countries.

Integration of digital technology in Croatia's Recovery and Resilience Plan Croatia's plan features a number of measures to support the integration of advanced technologies into the public and private domains. These measures include support to strengthen capacities for digital transformation through the European Centre for Innovation, Advanced Technologies and Skills Development (ECINTV) as a one-stop shop for the coordination and implementation of the relevant activities. Such activities include: (i) the digital transformation of the economy; (ii) lifelong learning and development of digital and entrepreneurial skills; (iii) access to the latest knowledge and resources for testing and experimenting with digital solutions needed to develop new products, processes and business models for users; and (iv) networking and strengthening national ecosystems for digitally focused stakeholder innovation and entrepreneurship at national and European levels.

The objective of this investment is to put in place the framework to establish and monitor Digital Innovation Hubs (DIHs) in Croatia. The investment has a budget of about EUR 7.5 million. The measure also includes co-financing of up to four DIHs under the Digital Europe 2021-2027 programme. The plan will support the EDIHs so that they can provide four types of services to SMEs:

- testing before investing,
- skills development and training,
- access to finance; and
- support for networking and development of innovation ecosystems.

Digital Public Services in Croatia's Recovery and Resilience Plan

The Plan includes significant investments for the digitalisation of public administration, supporting the modernisation of the digital infrastructure and the improvement of digital public services for citizens and businesses. The plan includes a number of consistent measures to improve the interoperability of information systems used by the Croatia's government, which will materialise with the establishment of a central register for public authorities and support data driven decision-making at all levels of the administration. It is reinforced by significant investment to expand the capacity of the State cloud and integrating it into the Common European Data Spaces. The plan includes an investment to create a one-stop-shop harmonising and centralising the helpdesk system of all public administrations' online services to strengthen the interactions between citizens, business and public services. The plan also includes an investment to enable citizens to easily use online public services, by creating a mobile e-service platform, promoting the use of electronic signatures in citizens' interaction with the public administration and investments for development of digital identity card.

3.2.2. Other policies and strategies influencing (rural) digitalisation

Highlight 2020-2021: e-Health in Croatia

Croatia was an early adopter of e-prescriptions; currently less than 2% of all prescriptions are issued on paper. It also pioneered cross-border e-prescriptions. All four services with 12 cross border exchange routes are currently available between Croatia, Estonia, Portugal and Finland. Croatia and Portugal are the only EU countries participating in the eHealth Digital Service Infrastructure (eHDSI) with all four services and Croatian doctors can receive patient summaries from other EU countries. By 2022, it is expected that the interoperability of Patient Summary exchange will be established with 15 EU countries. As a part of joint EU digital response to the COVID-19 pandemic, Croatia has implemented the 'Stop COVID-19' app for exposure notification. It was launched nationwide in July 2020, and successfully connected to European Federation Gateway Service (EFGS) on 16 November 2020.

Additionally, as part of public-private cooperation, a chatbot application for Messenger (Facebook) was created and linked to the Facebook page of the Croatian Institute of Public Health¹⁹ to further assist the general public and provide crucial health information and guidance. Croatia is also presenting very ambitious investments in the national Recovery and Resilience Plan, notably in

telemedicine, with the largest investment in digitalisation of the National Oncology Network and a national oncology database, alongside measures in e-care, tele-transfusion and robotic surgery.

Croatia is progressing with the **START platform** that enables members of the public to start a business remotely and without intermediaries, via one single electronic procedure at a single digital location. In parallel, the Financial Agency (Fina) is preparing to introduce 20 physical locations in its branches to assist users who are not electronically literate in using the platform. By April 2021, 1,283 companies had started operations using the platform.

During 2020, 24 new e-services were integrated in the e-Citizens system, which is currently used by over 1.2 million users. It was redesigned in April 2021 and offers a total of 89 e-services. In addition to the visual and interface changes, the system was adapted for use by mobile devices. It is following a recently published 'Standard for the Development of Public e-Services' (April 2021), which includes guidelines for developing intuitive user interface in e-services. New services launched in 2020-2021 include the 'e-children' card, e-wedding registration, industrial property registration, and e-renovation. 2020-2021 also saw the establishment of the platform for electronic payment of fees and/or charges. The system also enables card payment of administrative fees or charges. It lays the ground for further development of more complex electronic services in both the 'e-citizens' and 'e-business' systems.

Croatia launched several activities in the area of e-accessibility. Among the most prominent was a dedicated course for public service officials in charge of public service websites. In 2020, the programme was completed by 646 participants with more training planned for 2021. Croatia has been working on the next comprehensive and medium-term strategic framework for public services e-health development (the Croatian e-Health Strategic Development Plan) and its corresponding Action Plan. The plan incorporates the most recent developments in e-health and actions planned for 2021-2027. Croatia continue to invest in e-health and telemedicine services, which have proven especially important during the global pandemic (for more on advancements in e-health solutions, see the highlight 2020-2021 box below).

Croatia could see even more improvements in digital public administration if it were to make e-services for the public and businesses more user-friendly and easier to access. Additional measures to promote the use of e-government services could boost take-up of these e-services. Concentrating on reskilling and upskilling of healthcare professionals and bridging the shortfall in qualified ICT experts in health will be even more important if Croatia is to tap the full potential offered by the digital economy. Important complementary actions to promote and strengthen digitalisation of public administration and public services include further simplification efforts, as well as measures to ensure interoperability between governmental services and data.

Table 13: National Policies

Ministry / Authority	Policy	Objective	Expected Impact
Ministry of health	The National Health Development Strategy ²¹	The Strategic Plan for eHealth Development	Development of informatisation and eHealth
Government of Croatia	National strategy for the development of broadband access in the Republic of Croatia in the period from 2021 to 2027	Further development of broadband access, with intensified activities to eliminate the observed one's obstacles and shortcomings in development so far	address all barriers that cause expected availability goals broadband access by 2020 have not been achieved. Such an approach creates the preconditions for stopping the further lag of Croatia in the development of broadband access within EU
Ministry of Agriculture	The National Strategic Plan for Aquaculture Development for the period 2014-2020	States the need maintenance of the fisheries geoinformation system	improving the social and business environment in aquaculture development, increasing the national consumption of aquaculture products, and increasing the employment in the aquaculture industry, while furthering the development of local communities
Ministry of Agriculture	The Rural Development Program 2014-2020	increasing the competitiveness of Croatian agriculture, forestry and processing industry, but also improving living and working conditions in rural areas in general	emphasises the need to develop ICT infrastructure in support for rural development
Ministry of Construction	Spatial Development Strategy of the Republic of Croatia	Recognition, preservation, promotion and sustainable use of the values of Croatian space, especially those on which its identity is based, is promoted by the concept of spatial development and realisation of priorities and directions of spatial development and implementation of all plans, programs and projects. and affect the Croatian territory.	Sea, coast and islands, waters, airspace, mineral resources and other natural resources, but also land, forests, flora and fauna, other parts of nature, real estate and things of special cultural, historical, economic and ecological significance, for which is determined by law that they are of interest to the Republic of Croatia, they have its special protection.

Ministry of Economy and Sustainable Development	Sustainable Development Strategy of the Republic of Croatia	basic principles and criteria for determining goals and priorities in considering long-term transformation towards sustainable development of the Republic of Croatia	stimulating the growth of the population of the Republic of Croatia; environment and natural resources; focusing on sustainable production and consumption; achieving social cohesion and justice; achieving energy independence and increasing energy efficiency; strengthening public health; connecting the Republic of Croatia; protection of the Adriatic Sea, coast and islands.
Office of the National Security Council	National Cyber Security Strategy	ensures the implementation of the law in the new, the virtual dimension of society, in line with real-world legal practice	Safety in cyberspace

3.2.3. Policies and strategies to boost digital literacy and tackle the digital divide

Croatia recognises education and science as developmental priorities that can enable its long-term social stability, economic prosperity and secure cultural identity.

The Croatian Parliament adopted Strategy of Education, Science and Technology in October 17, 2014 and appointed the Special Expert Committee for the Implementation of the Strategy of Education, Science and Technology.

Committee's task is to create Action Plan of the Strategy's implementation, coordinate responsible stakeholders and define implementation indicators showing efficiency of the Strategy's objectives and measures implementation. Additionally, the Committee will organise projects for the creation of Action Plans addressing particular complex measures and setting-up of working groups that would thoroughly elaborate Strategy in its specific segments. Finally, the Committee will report The Government of the Republic of Croatia about its work and results at least once in a year in the written form.

Nove boje znanja (new colors of knowledge)

The Committee presented project of the Strategy's implementation called "Nove boje znanja" and the new web portal novebojeznanja.hr

Concept of the Strategy

On drafting of the Strategy between 2012 and September 2014 more than 130 experts were involved, without any compensation, in the 19 different working and thematic groups, established in order to create comprehensive strategic document that recognises education and science as the Croatian developmental priorities. In the globalised world of the dynamic social, economic and cultural changes, simultaneously faced with the challenges of the new technologies, environmental protection and the aging of the population, with the limited human, material and natural resources, Croatia must anticipate long-term development and be ready for the adjustments.

Demographic, economic and cultural changes in which Croatian society is currently situated are the most solid basis of the Croatian Strategy of Education, Science and Technology and it is the responsibility of the state to develop and manage its education system in cooperation with the private sector. Creation of the innovative society and economy, well-adjusted to the future unpredictable challenges is the necessary precondition for the shaping of creative human knowledge capital that in modern societies has advantage over natural goods capital and routine work and even over financial capital. Knowledge has extraordinary importance in the projections of the strategic development.

Future development will not be aimed at increasing capacity (number of institutions and programs) in settlements where there are enough of them and where is a relatively high share of educated citizens, but primarily on the organisation of adult education in rural and less developed areas countries, in existing educational institutions. He wants to improve quality and relevance of the existing program offer, introduce financial grants and benefits for individuals and employers and encourage higher education institutions to be more strongly and qualitatively involved in adult education.

Lifelong learning is perceived as a foundation of the education that encourages individual from the different age groups to study through the different learning forms and with the continuous access to the education. Lifelong learning, science and innovation shape the knowledge triangle to which the state provides conditions for the efficient functioning.

Principles of education

Education will be built on the following principles:

- Compulsory primary education.
- Horizontal and vertical mobility within the system.
- All persons, especially marginalised and underrepresented groups, will be incorporated in the education system based upon the scientific knowledge.
- Competent employees in the system that respect the professional ethics.
- Decisions will be made in the democratic way with the participation of all key stakeholders.
- Schools and teachers will be independent in defining methods of work.
- Interculturalism and the European dimension of the education will be respected.

This Strategy is envisaged in the way that it proposes measures that are aligned with the envisaged strategies of the European Union and goals whose realisation is expected until year 2025.

Principles and preconditions of the Strategy

Realisation of these strategic goals is possible only if the long-term strategic vision of development is followed, aiming to achieve comprehensive, flexible and efficient education system that connects different levels and forms of education and research in the harmonious and transparent entity based on the joint positive values, principles and goals.

Croatian Strategy of Education, Science and Technology that is, among other things, directed at education that actively promotes comprehensive individual development of every pupil and student, promotes social equality and democratic values and strongly contributes to the social and economic development. Education system will ensure acquisition of knowledge, skills and values to every pupil and student that are necessary for the successful life in the modern society by qualifying them for the lifelong learning and work and enabling their development as the creative, active and self-confident individuals responsible for personal and social progress.

Strategy must ensure flexibility and adaptability of the education and research system, while at the same time it must be subject to the continuous review and period revision process. Consequently, the Strategy must also be adopted by the all interested stakeholders, meaning entire Croatian society and political parties in order to secure its continuous and consistent implementation in the long-term period.

Taking into consideration that Croatia has restricted human and material resources at its disposal, it is necessary to devise gradual changes that would utilise everything recognised as valuable in the education and research system, while at the same time not hindering quality foundations and securing accomplishment of the best possible results with the invested resources and goals.

Strategy is based on the following principles:

- Decision-making based on the data analysis
- Efficiency of the system and the enhanced financing.
- Introduction of changes in the gradual and logical matter.
- Systematic monitoring and evaluation of the results of the implemented measures.

Basic principle upon which the entire Strategy is built is the autonomy of all the institutions and employees in the area of education and science. However, achieving this kind of autonomy requires certain preconditions.

First precondition is the existence of clearly defined outcomes of every education segment, where Croatian Qualification Framework represents an important tool.

Second precondition is the existence of the quality assurance system that would examine success of the learning processes and the research work.

Furthermore, **an important precondition** is the enhancement of the levels of their competences by improving the initial education system and the continuous professional training.

Strategy's implementation process in the areas of education and research development comprises relevant legislation and concrete measures and decisions. Furthermore, it has to be supplemented through the work of all ministries, responsible agencies and other public institutions and through the coordination of all strategies dealing with the education and science.

Main goals of the Strategy are:

- Quality education available to everybody under equal conditions.
- Strategy introduces lifelong learning as a principle on which the entire education is based. The goal is to develop processes and the recognition system of the non-formally acquired knowledge and skills and spur application of the information and communication technology (ICT) in the education.
- In the pre-tertiary education, entire curriculum reform will be implemented, comprehensive support system towards children and pupils will be established and the quality of the education system will be enhanced in all its segments.
- In the higher education, studying programs will be enhanced and the foundations of the Bologna reform will be consistently implemented. Additionally, the quality faculty structure and the efficient and developmentally-stimulating system of the higher education institutions will be secured. Finally, the student standard with the special care towards the social dimension of studying will be improved.
- In the adult education, the goals are: securing preconditions for the increased participation of adult citizens in the lifelong learning processes, improving and widening of the learning process.
- Regarding science and technology, the goals are internationally competitive public universities and the public research institutions and increased investment in research and development by improving the public financing system and encouraging investments of the private and social sector in research and development.

The Government of the Republic of Croatia has organised a Facebook chat „Reformiramo obrazovni sustav – nove boje znanja“ in order to inform citizens about the Strategy's implementation.

Digital Literacy Development Network

Digital literacy development network is a three-year project for the development of a network of partners from the civil, public and private sectors whose goal is the development of digital literacy of citizens. Digital.hr aims to network stakeholders in the development of digital literacy in Croatia.

Project holder is Telecentar and the Project partners are Faculty of Electrical Engineering and Computing, University of Zagreb, Faculty of Organisation and Informatics Varaždin Croatia, University of North Koprivnica, Institute of Public Finance Zagreb, University of Algebra Zagreb, Technical Culture Center Rijeka, ODRAZ – Sustainable Community Development, Institute for Youth Development and Innovation Zagreb, Croatian Informatics Association Zagreb, Croatian Association of Informatics Zagreb, Association of Croatian High School Principals Zagreb, Croatian Employers' Association Zagreb, Association "Dobar dan" Zagreb. Implementation period of the Project is October 29, 2020 – October 28, 2023 and the source of funding is European Social Fund – Thematic networks for socio-economic development and the promotion of social dialogue in the context of improving working conditions with the project value of 479.849 EUR

During the project, scientific research and development guidelines in the field of Digital Citizenship, Digital Education, Work will be provided and New Occupations, and Digital Talents and Innovations will be conducted. The project work on building additional capacities for participation in European projects of research and development of the digital society, and brand Croatian examples of good practice in the country abroad.

Network members are able to join working groups 1. Digital Citizenship; 2. Digital education, work and new occupations; 3. Digital talents; Digital research, development and innovation and 4. Digital branding of Croatia.

Aims

Developing dialogue and strengthening cooperation between civil society organisations, local and regional self-government units, state administration, companies and educational and scientific institutions with the aim of developing digital literacy in the Republic of Croatia

Strengthening the partnership of civil society organisations and involving new members of the thematic network, Public opinion polling and society needs testing, Advocacy and implementation of a structured dialogue of all stakeholders and decision makers

Capacity building for participation in digital society research and development projects and programs, conducting scientific research in the area identified the necessary social change, development of guidelines for policy development, making a social impact analysis

ODRAZ's role in the project

ODRAZ is the coordinator of working group 1. Digital Citizenship, which will contribute to the implementation of the "Digital Society Creation Policy" within the EU strategy for the development of the Digital Single Market by conducting research and developing inclusive guidelines for decision makers at the national and local level. The policy envisages building smart cities, improving access to e-government, e-health services and digital skills, thus enabling the development of a truly digital European society.

Table 14: Programmes 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
Nove boje znanja (new colors of knowledge)	Increasing skills in the use of new technologies and digital tools	Digital diary, audiovisual report video	2014-2025	Croatia	http://novebojeznanja.hr	Public	Regional	G
e – School - Strategic framework for digital maturation of schools and the school system in the Republic of Croatia (2030)	acquiring digital skills	Digital Literacy	2020 - 2030	Croatia	https://mzo.gov.hr/UserDockets/Images/dokumenti/PristupInformacijama/Strateski-digitalno2030/Strateski%20okvir%20za%20digitalno%20sazrijevanje%20skola%20i%20skolskog%20sustava%20u%20Republici%20Hrvatskoj%20-%202030.pdf	Public	Regional	G
Digital Literacy Development Network	provide scientific research and development guidelines in the field of Digital Citizenship, Digital Education, Work and New Occupations, and Digital Talents and Innovations will be conducted	scientific research, development guidelines in the field of Digital Citizenship, Digital Education, Work and New Occupations, and Digital Talents and Innovations	2020-2023	Croatia	https://www.odraz.hr/projects/all-projects/digital-hr/?lang=en	Public	Regional	G
Medijska pismenost	To provide education professionals with the resources and support required to help pupils safely navigate the digital world.	cyberbullying, social networking, schools	2016 -	Croatia	https://medijskapismenos.hr	Public	Regional	G
Youth e-Perspectives on Migration	Digital skills will be developed in parallel with skills for civic participation in dealing with current social issues	e-perspectives, migration, digital skills of young people, active citizenship, social entrepreneurship, digital literacy in local communities	2016-2017	Croatia, Belgium, and Spain	http://www.yep4europe.eu/	Private	International	G

3.2.4. Policies and strategies that incentivise digital innovations

EIP- Agri initiative Croatia

EIP-AGRI initiative in Croatia is implemented as Measure 16 of the National Rural Development Plan for the Republic of Croatia in the period 2014 – 2020. As new CAP is still not in force the measures and interventions from the previous period were extended to the year 2021 and will be extended to the year 2022. Overall Measure 16 planned activities included formation of Operational Groups as well as Short value chains and local markets. Till now two calls for Operational groups were made with the second one just recently closed (call closed on 31st of August 2021). Applications on the calls for Measure 16 resulted in active 10 initiatives with 8 operational groups.

Active EIP Operational groups in Croatia (November 2021)

1. Adaptation of wine production to climate change
2. Research of production mechanisms for recovery of plant waste in agricultural production - OBO
3. Application of biomass ash to improve agricultural production and soil fertility
4. Possibility of use of biogas digestate as a fertiliser and soil conditioner
5. Application of available online satellite photo services within the capabilities and needs of domestic food producers
6. Innovative methods of monitoring, forecasting and pest control
7. Fast detection of plant pests in cereal production
8. Adaptation of soybean production to drought stress and formation of the recommended assortment for the production areas of continental Croatia

Active Short Value Chain groups in Croatia (November 2021)

1. Locality – innovative short value chain on local markets
2. Development of a short supply chain "Hello Križevci"
3. Short value chains from Cvelferija
4. MEĐIMURSKI PINKLECI – grows in my heart...
5. "Blue see – green mountains " – implementation of short value chain
6. "Friški frutti i verdure" – sales of fresh fruits and vegetables in specialised shops and delivery to the restaraunts
7. Short value chain and local market group "Zagorci"

Smart villages

The problem of lagging behind rural areas in relation to urban areas and depopulation of these areas is not only a problem of Croatia or Eastern European countries but is also present in the most developed countries of the European Union, and it is accepted that solving this problem is of strategic interest for Europe. At the plenary session held in March 2019, the European Parliament accepted Smart Villages as a new concept for the development of rural areas in the new financial period 2021-2027. and decided to finance this concept from the European Regional Development Fund and the Cohesion Fund with at least 2.4 billion euros, but also with the possibility of additional funding from other EU funds.

Smart villages - definition

"Smart villages" are communities in rural areas that use innovative solutions to improve their resilience, building on local strengths and capabilities. They rely on a participatory approach in developing and implementing their strategy to improve economic, social and / or environmental conditions, in particular by mobilising solutions offered by digital technologies. "Smart villages" benefit from cooperation and networking with other communities and actors in rural and urban areas. The launch and implementation of Smart Villages strategies can be based on existing initiatives and can be funded from a variety of public and private sources.

Communities in rural areas may comprise one or more human settlements, without any restrictions on administrative boundaries or population. As regards eligibility conditions for support, Member States may use definitions of rural areas as provided by the OECD, EUROSTAT or other definitions.

Participatory approach means the active participation of the local community in the development and decision-making regarding the concept of "Smart Villages". During the implementation phase, a participatory approach will ensure that capacity building and training needs are adequately addressed.

Digital technologies include information and communication technologies, big data exploitation and / or innovations related to the use of the Internet of Things (IoT). They act as a lever that allows "Smart Villages" to become more agile, make better use of their resources and improve the attractiveness of rural areas and the quality of life of rural residents. In any case, the use of digital technologies is desirable but not a prerequisite for a particular community to become a "Smart Village". Where possible, high-speed broadband access will facilitate the deployment of digital solutions.

Smart Village strategies respond to the challenges and needs of their territory by building on their local strengths and strengths. Strategies must set short-term, medium-term and long-term goals. Progress must be measurable using performance indicators to be set in the roadmap. These roadmaps should be reviewed at regular intervals to allow for continuous improvement. Strategies can aim, for example, to improve access to services (in various areas such as health, training or transport), to improve business opportunities and create jobs, to develop short food chains and agricultural practices, to develop renewable energy sources, to develop circular economy, for better use of natural

resources, for adaptation to climate change, preservation of the environment and biodiversity, for better valorisation of cultural heritage for greater tourist attractiveness, etc.

Rural areas across Europe are undergoing rapid change. The transition contains a risk, but also a real opportunity for rural areas to play a new and more noticeable role through the new concept of development "Smart Villages".

Table 15: Policies influencing digitalisation in rural areas

Initiative	Brief Description	Objectives	Area of impact	Period of implementation	Budget (if any)	Public / Private	Are rural areas specifically mentioned or addressed? Y/N	Link
Smart village - Babina greda	Smart villages are targeted at local governments in rural and island areas that use innovative solutions	<ul style="list-style-type: none"> networking of farmers from the area of the municipality introduction of crop and field monitoring systems by drones a small pasta factory special meat processing plant greenhouse heating systems 	Locally	2021. - 2027.		Public	Y	https://babinagreda.hr/category/smart-rural-21/
Central European Initiative - CEI	The foundations of the Central European Initiative (CEI) were established in 1989, when the foreign ministers of Austria, Italy, the former Yugoslavia and Hungary, at a meeting in Budapest, formulated and adopted the Joint Declaration on the Establishment of the Quadrigal. In the following years, with the accession of the former Czechoslovakia and Poland, it changed its name to the Hexagonal, and the name Central European Initiative was given in 1992, and today it has eighteen-member states. The Republic of Croatia became a member of the CEI in July 1992.	A multilateral approach to cooperation is encouraged, which is confirmed by joint political and economic actions. Areas of cooperation are climate, environment and sustainable energy, entrepreneurship development, human resources development, information, society and media, intercultural cooperation, multimodal transport, science and technology, and sustainable agriculture.	International	1992. -		Public	N	www.cei.int
Danube Strategy - EUSDR	a macro-region program involving nine EU Member States (Austria, Bulgaria, the Czech Republic, Croatia, Hungary, Germany, Romania, Slovakia, Slovenia), partner countries (Bosnia and Herzegovina, Montenegro, Moldova, Serbia, Ukraine) and a number of stakeholders: regional and local government, NGOs, academic institutions,	prosperity and improvement of the quality of life for about 115 million people. Croatian priorities relate to transport connections (navigation, multimodal transport, water management), economic development (energy networking, entrepreneurship, tourism), environmental protection, prevention of natural and other disasters, biodiversity, sustainable development) and civil society development (culture, science and education, civic initiatives)	International	2010 -		Public	N	www.danube-region.eu

	private sector, financial institutions							
Standing Working Group for Regional Rural Development, SWG	platform for networking and regional cooperation, and was established at the Agricultural Forum held in Macedonia and Serbia in June 2005. The SWG operates according to the conclusions of the Agricultural Forum held in Leipzig	established on the basis of a common desire to establish an informal organisation for sustainable rural development in the countries of Southeast Europe, and consists of representatives of government institutions responsible for rural development of member states. The main objectives of the SWG are to identify the common needs and interests of countries in the field of rural development, support joint planning of cross-border rural development projects as well as support different institutions in meeting the needs of member states	International	2005 -		Public	Y	www.seerural.org
EU macro-regional strategy for the Adriatic and Ionian region - EUSAIR	Successful cooperation of Adriatic region members led to the launch of the Initiative for the adoption of the EU Macro-Regional Strategy for the Adriatic and Ionian Region	<ul style="list-style-type: none"> • promoting a sustainable economy and the well-being of society in the Adriatic and Ionian region through growth and job creation, improving its attractiveness, competitiveness and connectivity, while protecting the environment and ensuring a healthy and balanced marine and coastal ecosystem • assist candidate and potential candidate countries on their path to EU accession 	International	2014. -		Public	N	www.adriatic-ionian.eu

3.3. Contributions from the Structural and Investment Funds and the Cohesion Policy

3.3.1. Broadband infrastructure

In July 2016, Croatia adopted the Strategy for Broadband Development in the Republic of Croatia for 2016-2020. The main objectives to be achieved by 2020 are to provide NGA coverage enabling internet access at over 30 Mbps for all inhabitants and to have at least 50% of households using internet access services at 100 Mbps or more. Croatia faces a number of challenges related to connectivity, especially with regard to the NGA coverage, as it is significantly below the EU average.

The Strategy is accompanied by the National Framework Programme for the Development of Broadband Infrastructure in Areas Lacking Sufficient Commercial Interest for Investment (the Programme). In July 2016, Croatian Government appointed HAKOM the Competent Authority for this Programme. The Programme sets out the procedures for State aid and the public deployment of information and communications technology infrastructures in access networks with a download speed of at least 40 Mbit/s and an upload speed of at least 5 Mbit/s in areas that do not have such broadband infrastructure, or are underserved (white NGA areas where speeds of less than 30 Mbit/s are available, with no NGA network or none planned to be deployed in the next three years). Besides general State aid rules, the Programme also includes guidelines for local municipalities on implementing individual projects within the Programme. They include the choice of the investment model that best meets local needs and ties in with the parameters of the project in question. In January 2016, the European Commission found that the notified State aid measure was compatible with the internal market pursuant to Article 107(3)(c) TFEU. The overall estimated (maximum) budget of the measure is €252 million, €117.2 million of which will be funded by the European Regional Development Fund and the remaining €134.8 million of which by a loan from the European Investment Bank. It is expected that private funds will amount to €120 million during the implementation of the project. The annual budget is €31.5 million for 2016-2023. The complementary programme for high-speed broadband development is the next-generation network backhaul scheme the European Commission is assessing.

The Competitiveness and Cohesion Operational Programme (2014-2020) stipulates that the European Regional Development Fund allocate €203 million to broadband roll-out.

Future Period 2021. – 2027.

National plan for the development of broadband access in the Republic of Croatia in the period from 2021 to 2027 represents the continuity of policy Of the Government of the Republic of Croatia in strategic planning for the development of broadband access in Republic of Croatia, following the

strategies for the development of broadband access for periods 2006-2008, 2009-2012, 2012-2015 and 2016-2020.

In March 2021, the Croatian Government adopted the National Plan for Broadband Development. The plan considers the EU 2030 objectives but mainly covers the components of the previous 2016-2020 strategy. Croatia took the necessary administrative steps to implement the previous strategy but did not achieve results in terms of infrastructure deployment. The National Framework Programme for the Development of Broadband Access Infrastructure, co-financed by the EU, is Digital Economy and Society Index 2021 Croatia expected to enable fibre coverage to 240,000 households by the end of 2023. The public funding is expected to complement private investment in fibre coverage for 210,000 additional households and businesses. Despite these public and private investments, the national regulatory authority, HAKOM, has identified a EUR 778 million investment gap for 740,000 households to achieve complete VHCN coverage. Most of these investments are needed in rural areas. Croatia awarded spectrum for 5G use in a multiband auction concluded on 12 August 2021. The three largest operators all acquired frequencies in the 700 MHz, 3.6 GHz band and in the 26 GHz band. EOLO, a new entrant, also acquired a licence in the 26 GHz band⁶. Rights of use will be issued for 15 years, with a possible 5-year extension. One serious obstacle to national 5G developments is cross border interference from Italy in the 700 MHz band affecting the Croatian coastline. Another impediment to the timely allocation of 5G spectrum is that, in two counties in the northern part of Croatia, 70 MHz in the 3.4–3.6 GHz band are unavailable due to existing use and are expected to be freed only by November 2023. The remaining part of the band is available countrywide. Despite the lack of allocation of harmonised 5G spectrum, Hrvatski Telekom (in November 2020) and A1 (in December 2020) launched commercial 5G offers using DSS technology in the 800 MHz, 900 MHz, 1,800 MHz, 2,100 MHz and 2,600 MHz frequency bands, which facilitates the use of 5G technology in the existing 4G networks. A positive development much welcomed by the mobile network operators is the 50% reduction in fees for rights of use of frequencies for all spectrum used for mobile communication. The authorities have been active in addressing concerns over electromagnetic fields, in particular through information campaigns and an up-to-date platform providing relevant 5G-related information such as recent developments and test locations.

Here is very useful link <http://bbzone.hakom.hr/en-US/> with interactive maps.

3.3.2. Digital Public Services

The Republic of Croatia is working intensively on the introduction of e-government. Although many areas are very good covered by e-services, however, there is still room for improvement. They are also established key prerequisites for the development of e-services: e-identity, a secure box for communication with public administration, a unique place of access and identification / authentication and a system of public and based registers.

The use of the above is prescribed by the Law on State Information Infrastructure.

e – Usluge (e – Services)

For the purpose of easier comparative monitoring of the development of e-public administration, and following the European guidelines commissions, in the development of e-services, e-services for citizens and e-services for business entities are distinguished, and services are grouped according to the problems they solve, not according to the institutions that provide them. At the same time are in accordance with the guidelines of the European Commission, the levels of maturity according to which availability is measured public services on the Internet.

Each e-service is defined by different levels of computerisation, which are measured on a scale from 1 to 5, with the corresponding meaning:

1. Information: Only service information (eg procedure description) is available online.
2. One-way interaction: availability of forms in e-form for storage on a computer, blank forms can be printed on the printer.
3. Two-way communication: interactive filling of forms and applications with authentication, filling in the form starts an individual service.
4. Transaction: the entire service is available online, filling out forms, authentication, payment and delivery of receipts, orders or other forms of full service via the network.
5. Targeted service (proactivity / automation): service delivery is proactive / automated in such a way that only confirmation or consent is required from the user.

The current situation in the Republic of Croatia is such that the vast majority of e-services are still at the level of maturity 2, i.e. that it is a one-way interaction. The reason for this is that until the summer of 2014 it was not a unique place in the virtual world to interact with citizens and businesses, so each body, which wanted to provide personalised services, had to develop its own publishing system e-identity verification mechanisms.

e – Građanin (e- Citizens)

The e-Citizens project is realised through three main components, which make up the common infrastructure of the public sector:

- Central state portal system,
- National identification and authentication system,
- Personal user mailbox system.

Each component solves part of the above problems. The central portal addresses the issue of dispersion information and e-services, National Identification and Authentication System - NIAS addresses the issue electronic identity verification and a network for issuing one type of access has been developed elements, and the personal user box (OKP) is a mechanism for secure delivery personalised information to users.

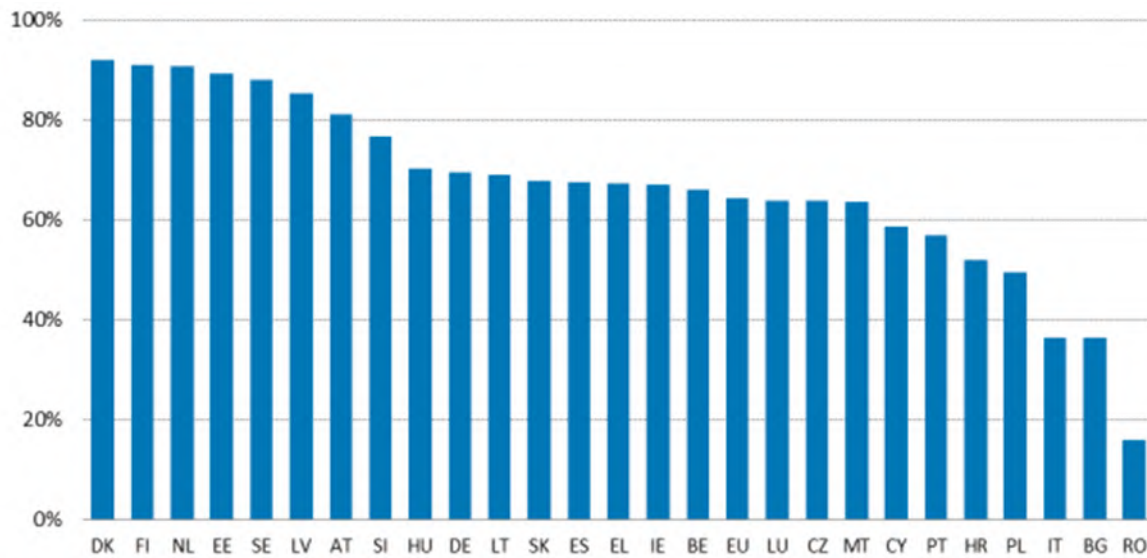
The Ministry of Internal Affairs is issuing an electronic identity card (eOI) with an identification card certificate, which is also the highest level of credentials, allowed access to all electronic services.

All the citizens who register as e - Citizen can access e - Services:

1. Family and life - Registration of a new born child and wedding, retrieval of electronic documents from the registry books and services of the social welfare system
2. Traffic and vehicles - Issuance of documents required for the management of various vehicles and other means of transport
3. Finance and taxes - Communication of citizens with institutions in the field of finance and taxes
4. Business - Starting a business in a simple way, tourist registration, chamber services
5. Rule of law and security - Communication of citizens with institutions in the field of internal affairs, justice, finance and the like
6. Upbringing and education - Review of grades achieved in primary and secondary school, application of study programs and online courses
7. Active citizenship - Citizens can be actively involved in communication with the state
8. Consumer rights - Check what rights you have in relation to public service providers
9. Health - Access to your personal health information as well as health insurance information
10. Work - Services related to the employment status of an individual
11. Housing and the environment - Utilities and similar services and cadastre and land registry services
12. Croatian war veterans - Services intended for Croatian veterans and members of their families

Croatia ranks 25th in the EU on digital public services (52 %), well below the EU average. Indicators show a low level of online interaction between public authorities, citizens and businesses but under Covid situation there is great tendency of rapid rise. Croatian internet users actively engage with e-government services in 52%. Croatia rating on pre-filled forms to reach 42 points. Croatia performs very well on the open data indicator, ranking 17th with 82%. Availability of e-government services for businesses is 64% and for citizens 60%.

Table 16: e-Government users interacting online with public authorities over the Internet in the last 12 months (% of internet users), 2020



Source: Eurostat, Community survey on ICT usage in Households and by Individuals.
 *Data for France was not collected for 2020

Table 17: Digital Public Services usage

		Extremely common	Very common	Fairly common	Not common for most of the population	It is not a possibility nowadays
e-Administration procedures	In general in the country		x			
	In rural areas			x		
e-Health	In general in the country			x		
	In rural areas			x		
e-Education	In general in the country				x	
	In rural areas				x	

Digital identity	In general in the country			x		
	In rural areas				x	
Digital signature	In general in the country				x	
	In rural areas				x	
On-line banking (account management, payments)	In general in the country		x			
	In rural areas		x			
Bills (council taxes, water, electricity)	In general in the country			x		
	In rural areas			x		

There is still no statistical database of usage of individual services, but in short time because of Covid situation it is evident that there is a great rise of usage of almost all of the services just to cut the risk, with all of this said table 17 based on personal perception.

3.3.3. Research and Innovation Strategies for Smart Specialisation (RIS3)

The adoption of the S3 in Croatia was a milestone in the development of the national innovation policy system. It envisaged not only a significantly greater amount of public financing to support the STI agenda but also strengthening of institutions that plan and coordinate STI policy. At the same time, due to its complexity, the S3 generated important coordination challenges for the system and institutions involved. It implied the creation of new instruments and the adaptation or use of existing ones. It also required coordination with the existing STI strategic framework, such as the Strategy for Fostering Innovation 2014–2020.

The challenges and delays in the design and implementation of the policy jeopardised the key principles behind a coherent S3, particularly the use of the bottom-up approach. The policy adoption process took longer than expected. The Croatian government adopted the S3 in March 2016, more than two years after the start of the EU financial perspective 2014–2020. This caused delays in launching S3 programs funded through ESIF, given that the adoption of the strategy was a pre-condition for their launch. In particular, this affected the Operational Program Competitiveness and Cohesion 2014–2020 (OPCC), which was envisaged to fund by far the largest share of ESIF S3 programs in Croatia. The OPCC and the S3 were to some extent developed in parallel. (The OPCC was adopted in December 2014.) However, the final stage of S3 preparation in 2015 and the beginning of 2016 was conducted after the key aspects of support programs had already been set up in the OPCC, before the

strategic vision of the S3 was formulated. This created the risk of a serious disconnect between the S3 and OPCC in the goals, instruments, indicators, and funding that could best address the competitiveness gaps, especially those that were identified through the EDP in 2015–2016.

Some of the key institutions that enable the proper functioning of the policy framework have been partially deployed, which may harm policy effectiveness. Examples are the National Innovation Council, which was established in July 2018 and had its first meeting in December 2018, and the Innovation Council for Industry, which was established in December 2017, and had its first meeting in September 2018. The setup of the policy governance system and the key bodies envisaged for EDP continuation were delayed even further. Thematic Innovation Councils, envisaged in the S3 as the backbone of the EDP, only began working at the beginning of 2019. The delays in the deployment of appropriate institutions to operationalise the S3 framework reduce the effectiveness of the policy itself and the significant resources it mobilises.

The assessment of the intervention logic should provide policy makers with valuable insights ahead of the preparation of the next S3. Although initiated late in the process, the assessment of the intervention logic of the S3 will provide guidance to better practices for design, implementation, and monitoring. This should be particularly useful for the upcoming EU financial perspective. The proposed Regulation for the 2021–2027 medium-term financial framework, will include preconditions that must be met (so-called “enabling conditions”) in order to start allocating funds. The proposed enabling condition for the policy objective “A smarter Europe by promoting innovative and smart economic transformation” is good governance of a national or regional smart specialisation strategy.

3.3.4. Digital Innovation Centres (DIH)

There are 10 Digital Innovation Hubs associated to rural areas, agriculture, and forestry sectors in Croatia.

AgriFood Croatia <https://agrifoodcroatia.com/>

Digital Innovation Hub ‘AgriFood Croatia’ is a not-for-profit networked organisation of Croatian research, public institutions and private business with a common goal of co-creating and implementing technological innovations for the agriculture, aquaculture and food sectors.

The overall mission of AgriFood Croatia is to contribute towards the digitisation of agriculture, aquaculture and food sectors, in accordance to the principles and priorities outlined in the EU Declaration of ‘A smart and sustainable digital future for European agriculture and rural areas’.

The DIH acts as a one-stop-shop for innovation-related expertise, guidance, support and specialised services. It is the only Croatian DIH directly focusing on agriculture, aquaculture and food technological innovations, proving national and international partners with localised know-how and specialised excellence. AgriFood Croatia facilitates strategic partnerships and enables cross-border collaboration opportunities for projects, start-up’s and SMEs working with digital-based technologies, as well as serving industrial enterprises and farmers interested in implementing these solutions. The activities

of AgriFood Croatia are not-for-profit and aimed at encouraging economic growth for its network members, partners and other beneficiaries.

AgriFood Croatia is directly contributing to innovation in 'Food and bio-economy' – one of the five main thematic priority areas (TPA) identified in the Croatian Smart Specialisation Strategy (S3). In addition, the technological competence areas of AgriFood Croatia are also directly related to the two cross-cutting themes (CCTs) identified in the Strategy – Key Enabling Technologies (KETs) and Information and Communications Technology (ICT).

The priority of Croatia in the first few years of S3 implementation is to create a climate that is favourable for innovation and to stimulate business sector investments in R&D activities in order to develop new products, services and technologies that will enable modernisation and diversification of the Croatian economy, with the AgriFood Croatia DIH providing significant contributions to innovations in the agriculture, aquaculture and food sectors.

In the context of international initiatives, AgriFood Croatia is basing the objectives of its activities according to the vision outlined in the EU Declaration of 'A smart and sustainable digital future for European agriculture and rural areas'. The Declaration is signed by 25 EU countries and supports digitalisation of agriculture and rural areas in Europe. It recognises the potential of digital technologies at tackling important and urgent economic, social, climate and environmental challenges facing the EU's agri-food sector and rural areas.

To this end, AgriFood Croatia is joining the SmartAgriHubs consortium. SmartAgriHubs is a major EU project under the Horizon 2020 instrument that brings together a consortium of over 164 partners in the European agri-food sector. The project aims to realise the digitisation of European agriculture by fostering an agricultural innovation ecosystem dedicated to excellence, sustainability and success. SmartAgriHubs employs a multi-stakeholder approach and covers a broad value-chain network across all EU member states. The consortium includes a diverse network of start-ups, SMEs, business and service providers, technology experts and end-users. The end-users form the core of the project and are the driving force behind digital transformation. The development and adoption of digital solutions is achieved by a tight ecosystem of 140 Digital Innovation Hubs embedded within 9 Regional Clusters, which are led by organisations that are closely involved in regional digitisation initiatives and funds.

DIH PANNONIA <https://www.ra-vs-z.hr/digitalni-inovacijski-centar-dih-pannonia/>

DIH PANNONIA, located in Vinkovci, Croatia, is a digitalisation promotion centre. It operates as the centre for digital transformation of entrepreneurship and food processing sector, while VSC DA holds the role of activity coordinator. DIH PANNONIA is an instrument of support to economic entities, emphasising on food processing sector, with the purpose of competitiveness improvement by developing their business and production processes using the implementation of digitalisation and creation of new products and services. DIH PANNONIA services will enable digitalisation and introduction of Industry 4.0 into economic entities with an emphasis on agriculture and food industry.

DIH PANNONIA users are scientific research centres, public institutions and economic entities in the Slavonia, Baranja, and Srijem area.

DIH TERA <http://portfolio.web.tera.hr/index.php/dih-tera/>

DIH TERA (Digital innovation hub TERA) is a consortium that functions as a one-stop-shop and provides companies with the possibility of enhancing their competitiveness concerning their business/production processes, products or services by using digital technologies. DIH TERA is based on technological infrastructure (Competence Centre – CC) and provides access to the latest knowledge, expertise and technologies for providing support to companies in the implementation of pilot projects, testing and experimenting with digital innovations. The hub provides business and financial support for introducing innovations, if necessary, through the value chain, and acts as the first regional contact point that strengthens the innovation ecosystem.

The DIH TERA consortium consists of organisations based in East Croatia, among which there are constituents of the two East Croatian universities and development agencies from all five of the region's counties, as well as business support institutions and renowned Croatian SMEs with extensive knowledge and experience in the IT sector and digitalisation processes. The coordinator is an SME with a not-for-profit clause, established by the Josip Juraj Strossmayer University of Osijek, Osijek-Baranja County and the City of Osijek.

All the partners undertake not to make profit from the activities implemented within the DIH, in compliance with the not-for-profit clause.

BlueDIH <https://www.bluedih.com/>

The non-profit mission of BlueDIH is to enable growth and competitiveness of the regional blue and green economy through pan-European networking, stimulation of excellence in digital transformation and transfer of new knowledge and technology in HPC, AI and advanced digital skills.

BlueDIH coordinator is the University of Split which has been a partner in Enterprise Europe Network since 2008 serving regional SMEs in internationalisation, innovation and access to funding. Numerous existing activities will serve as a platform for transformation and creation of new BlueDIH. The University of Split has been recognised as a Proof of Concept centre, leading startup support institution in the region (SHIFT conference, PICS, ML/AI meetups, etc.). The University is also one of the founding partners of European University of the Seas and coordinator of the quintuple helix activities and digitalisation and resilience activities.

With its partners through 4 counties of the Croatian Adriatic region, with centres in Split, Dubrovnik, Zadar, Knin and Šibenik, BlueDIH is covering the historical region of Dalmatia while providing its services throughout Croatia and Europe. Structure of partnership is using academic institutions as the backbone, public authorities as an additional dimension of sustainability and in supporting the digital transition of the public sector together with support institutions such as business incubator and innovation development agencies. As DIH in preparation BlueDIH is currently preparing call for

partnerships with private companies and relevant representatives of the industry on the competitive basis.

3.4. CAP National Strategic Plans

The new CAP which starts in 2023 aims to foster sustainable and competitive agricultural sector and every member state creates its own National Strategic Plan as a result of the detailed analysis.

Croatian CAP Strategic Plan is still in the phase of negotiations with the European Commission and the final version still has not been submitted. However, draft version available in October 2021 was used.

SWOT analysis made as a prerequisite of the CAP Strategic Plan identified several items related to the digitalisation. Young farmers and implementation of new technologies was identified as an opportunity for several CAP objectives. One of the planned specific objectives: Promote employment, growth, gender equality, including the participation of women in farming, social inclusion and local development in rural areas, including circular bio-economy and sustainable forestry identified as a major weakness lack of education and use of digitalisation and new technologies. In addition, besides slow acceptance of technologies an uneven regional economic development and lack of broadband connection is also considered as a general major weakness. Lack of lack of public infrastructure in specified areas is identified as threat for the general CAP strategic plan. Current situation of broadband coverage and investment plans is in accordance with this. Major differences in the coverage and availability of commercial modern broadband connections exist in Croatia.

Almost every general goal of CAP strategic plan identifies digitalisation as one of the priorities for the future CAP. Need to encourage the investments in technology and innovations is based on the context of digitalisation of agricultural sector. Current situation is the digitalisation of agriculture is limited and there are opportunities to enhance it with the aim of increasing overall economic sustainability and resilience of agriculture to negative influences, especially climatic changes.

In addition, the need for enabling the access to knowledge and skills as one of the prerequisites of the functioning AKIS system in the country also includes interventions with the aim of fast digital transformation and evolution of agricultural advisory system and the strong emphasis on the use of digital tools and skills in the future CAP. As AKIS analysis report created in proAKIS and i2connect H2020 projects showed Croatian AKIS is fragmented with were limited knowledge flows established and used from the stakeholders. Advisory service and especially public advisory service went through several organisational changes in the last decade and its position in the AKIS was not stable. Cross-cutting objective of the new CAP and all provisional acts that must be considered have been included in the Croatian Strategic CAP plan for the next programming period. As digital technologies usually become a part of agriculture as a part of spill over effects from other industries, digitalisation of agricultural sector is relatively low and its improvement is one of the highlights of the new Strategic plan. As the negotiations process with the Commission is still ongoing the details of the strategic plan are still unavailable but the overall aim is to increase coordination, cooperation and partnership with all stakeholders of the agro-food chain and the knowledge creators (academic institutions, etc). The necessity to support the research and development of innovations is identified and appropriately addressed in the CAP strategic plan. Agricultural advisors are given a central role in the future AKIS of

Croatia and the need to empower them with skills is emphasised. Innovations should become more common and almost *usual* in the future and for an innovation to become successful several factors must be included. Besides the innovative idea as an initial spark the support in a view facilitating the whole innovative process is very important. The role of advisors as innovation brokers is being addressed through several planned interventions mostly through the AKIS related activities.

3.4.1. CAP Integrated Administration and Control System (IACS)

The Agency for Payments in Agriculture, Fisheries and Rural Development (Agencija za plaćanja u poljoprivredi, ribarstvu i ruralnom razvoju - apprrr) is a public body responsible for the operational implementation of direct support measures, rural development measures, maritime and fisheries measures (in part delegated functions) and measures of common market organisation, as well as keeping registers and registers and maintaining and the use of the Integrated Administration and Control System (IACS) through which direct payments to farmers are received, processed and controlled.

In coordination with the Ministry of Agriculture, it implements the measures of the Common Agricultural Policy and the Common Fisheries Policy, which are financed from the state budget of the Republic of Croatia and the budget of the European Union. This means that the Paying Agency is part of the management and control system of the following funds:

- European Agricultural Guarantee Fund (EAGF), which finances direct support measures and common market organisation measures
- European Agricultural Fund for Rural Development (EAFRD) which finances rural development measures
- European Maritime and Fisheries Fund (ERDF), which finances maritime and fisheries measures.
- The Paying Agency bases its work on the accredited processes and procedures of the European Commission in accordance with the Regulations and predetermined criteria applicable to the implementation of the Common Agricultural Policy (CAP) and the Common Fisheries Policy (CFP).

The Agency manages the following registers and databases:

- Register of farmers with 165,712 registered farmers
- ARKOD-system for digital identification of land parcels; and accompanying registers (vineyard register, register of primary food producers, register of entities in organic production),
- ISAP-centralised electronic database (for simultaneous data entry from all 26 APPRRR locations in the Republic of Croatia) and

- AGRONET - a protected internet application through which farmers view data on their farm and in which they electronically fill in aid applications.

It operates through the central office in Zagreb and 21 branches.

The work of the Paying Agency is supervised by the Administrative Council appointed by the Government of the Republic of Croatia, whose president is the Minister of Agriculture. Other members are one representative of the Ministry of Agriculture, the Ministry of Finance, the Ministry of Regional Development and EU funds, and a representative of the workers' council of the Paying Agency. The work of the Paying Agency is also supervised by other bodies, both the Republic of Croatia and the EU, all with the aim of ensuring an effective management and control system.

3.5. Data management

- Open Data

Project "TODO – Twinning Open Data Operational"

Approved by Horizon2020 programme – Twinning, started with its activities in October 2019.

This project has aims to leverage the interdisciplinary scientific excellence and innovation capacity of the University of Zagreb (UNIZG) in the field of open data to boost the supply and use of open government data in Croatia and beyond. Faculty of Geodesy, University of Zagreb is coordinating this EU project, led by Ana Kuveždić Divjak, Ph.D. Project partners are also Faculty of Electrical Engineering and Computing, Faculty of Organisation and Informatics, Faculty of Law, Faculty of Transport and Traffic Sciences, Faculty of Agriculture, Delft University of Technology and University of the Aegean. Total project budget is 799.988,00 €. Project will be completed by October 2022.

Project objectives

The main objective of the project is to strengthen the scientific excellence and innovation capacity of the UNIZG in the field of open data by cooperation with internationally-leading counterparts from the Netherlands (Delft University of Technology) and Greece (University of the Aegean).

Five objectives that need to be fulfilled to achieve the main objective:

- Objective 1: To establish an open data research environment that will facilitate and stimulate interdisciplinary multi-domain open data research within and beyond UNIZG, TUDELFT and UAEGEAN.

- Objective 2: To enhance the overall scientific R&I capacity of UNIZG significantly in the field of open data.
- Objective 3: To increase the research excellence of UNIZG, TUDELFT and UAEGEAN by collaboratively developing and applying an interdisciplinary and multi-domain open data research approach.
- Objective 4: To extend UNIZG strategic partnerships and strengthen its visibility and reputation among the national and international research community, industry, policy-makers and the general public.
- Objective 5: To secure a sustainable environment for future collaborations between UNIZG, TUDELFT and UAEGEAN.

<https://data.gov.hr/en>

- **Cybersecurity and data safety**

- Compliance with European Union regulations**

Croatian government passed the LAW ON CYBERNETIC SECURITY OF KEY SERVICE OPERATORS AND DIGITAL SERVICE PROVIDERS

This Act transposes into Croatian legislation Directive 2016/1148 of the European Parliament and of the Council on measures for a high common level of security of network and information systems throughout the Union.

This Act ensures the implementation of Commission Implementing Regulation (EU) 2018/151 laying down rules for the application of Directive (EU) 2016/1148 of the European Parliament and of the Council as regards additional specifications of elements that digital service providers must consider in the management of the risks to which the security of their network and information systems and the parameters for determining whether the incident has a significant effect.

The law regulates the procedures and measures for achieving a high common level of cyber security of key service operators and digital service providers, competencies and authorities of competent sectoral bodies, single national contact points, bodies responsible for prevention and protection against incidents and technical conformity assessment bodies, supervision of key service operators and digital service providers in the implementation of this Act and misdemeanour provisions.

The aim of this Act is to ensure the implementation of measures to achieve a high common level of cyber security in the provision of services that are of particular importance for the conduct of key social and economic activities, including the functioning of the digital market.

- **Interoperability**

National Identification and Authentication System (NIAS) and the EU/EEA structure for the interoperability of electronic identification. It is included in the cross-border authentication of Cross-Border Users and has the ability to recognise and process, i.e. forward data to other nodes and NIAS;

The National Identification and Authentication System (NIAS) means an information and technological system of central identification and authentication of electronic services users, which forms a part of the System.

NIAS is a system that is the central place of identification and authentication of users when logging in to the e-service. Its basic function is to securely and reliably provide electronic identification and authentication services using credentials.

4. Challenges and Opportunities

4.1. Barriers to digitalisation

As already mentioned Republic of Croatia is divided into 21 counties with 576 local governmental units on the total population of cca 4 million people. Majority of people live in rural areas and studies show that only about 30% of Croatian area is profitable in the perspective of broadband infrastructure.

All other areas must get state aid through projects. Local government units due to the small size have limited human capacities and experience in participation and overview of such projects and up to now it was a major obstacle in full implementation of action plans for digitalisation infrastructure in Croatia. Solutions to overcome scarcity of human resources included centralisation of projects on higher level of government organisation but then the new problem of limited coordination of plans and activities between and among local government units became apparent. Covid-19 pandemic slowed the projects f not completely paused them having no direct effect on the factors influencing them. Overall analysis showed that the simplification of procedures and administration burden could greatly improve building up of digitalisation infrastructure. Being a predominantly service-based economy with a tourism being a major driving force puts even more pressure on the existing broadband infrastructure. Tourists are mainly present in the summer months in the coastal part of Croatia with almost doubling total population in the Republic of Croatia during that period and in the coastal cities and villages increase in population in several orders of magnitude. The needs for digital infrastructure are during that period compared to urban areas while all indicators and development of infrastructure are as a typical rural area. That results in a poor user experience with slow internet speeds, long response time and cause a loss of profit to the economic entities in that areas during several of months per year. Solution is investment in a modern equipment but the lack of knowledge on technical characteristics as well as the real needs limits the improvement of the digitalisation.

Overall legal framework is being put in place for the period of the next 5 to 10 years. All the documents are being aligned with the strategic documents of the European Union. Strategic planning is being used and all involved stakeholders are being consulted through several cycles during the document creation. Known obstacles and barriers are identified and suggestion on how to overcome them are made available publicly. Large gap between rural and urban areas and differences between human resources and the level of knowledge, experience and competences became the challenge of digitalisation. Urban areas are driven by profit and private companies invest in the infrastructure and have in depth information on the needs and technical details needed to achieve expected results. As most of Croatia (70%) is “white area” and state aid is needed in the infrastructure and digitalisation build up, it is being prescribed through project calls. However, project calls need descriptions and funding allocations created by experts which are limited in rural areas. All of the mentioned presents a barrier to digitalisation without a single major negative factor but a couple of smaller ones with additive effects.

Overall COVID-19 impact on the digitalisation was opposite. Limitation of population movement caused a huge step up in acceptance of the use of digital technologies in all aspects of the society. All available services (e-government, e-health, etc.) improved during pandemic and became indispensable tools for everybody, and especially in a less populated rural areas with large distances between specialised government offices and services. On the other hand, there was stagnation in the infrastructure build in the country with the starting point of uneven development and a digital gap between rural and urban. Increase in usage of digital services put the under capacitated broadband infrastructure in the stress test and optimisation of the network usage was needed.

Table 18: Barriers to digitalisation

Barriers to digitalisation		Influence of COVID-19
Technical	Complicated government system with 21 county and 576 local government units covering small areas and small number of habitants per unit. Lack of cooperation between units on horizontal as well as vertical level.	Absent. Pandemic measures just paused all activities. No direct influence is expected
	Slower integration of new technologies in rural areas (implementation of 5G is slower outside main cities)	Negative. Economic restrictions resulted in only most profitable projects being implemented at the moment. Market recovery is needed for full implementation.
	Lack of technical knowledge on the technology	

Legal	Complicated system of governance with a lot of government units. Level of mandate needed (county level or local government level) to perform digitalisation projects is unclear.	
Training / Education	Lack of digital skills.	Positive. Digital skills improved overall due to movement restrictions.
	Lack of human resources for the application and implementation of EU projects needed for new infrastructure	
Economic	Only 30% of area populated enough to provide return of investment	
	Limited impact of innovation	
Others	Limited public data available	
	Lack of knowledge on available data sources	

4.2. Actions to boost sustainable digitalisation

Through the National Development Strategy 2021-2030 with The Smart Specialisation Strategy 2021-2029 and the National Plan for the Development of Artificial Intelligence on one hand, and through Croatia’s Recovery and Resilience Plan (RRP) on other hand Croatian Government plans to boost rural development in key areas of Human capital, Innovation and Investment. Big part of that plan, after drop of BDP caused by Covid pandemic, plays the Recovery and Resilience Plan (RRP) with the digital investments of a total of EUR 1,285 billion (20.4% of the plan’s budget).

Table 19: Actions to boost sustainable digitalisation

	Key rural development domains			
	Human capital	Innovation	Investments	Governance
Creating the basic conditions for digitalisation	Training for basic digital skills	Connecting the stakeholders	Public support for infrastructure projects	Action plans
Anchoring digitalisation to sustainable development	Advance use and training of	Definition of digitalisation	Linking investments and projects to	Monitoring of effects

	digital tools and skills	role in the national AKIS	sustainability goals	
Adapting digitalisation to different context	Profiling user skills	Interactive innovation	Strategic approach with strategies – action plan – investment plans in the top-down direction (national – regional – local)	Community needs
Favouring digital inclusion	Mapping vulnerable groups	Encouraging peer-to-peer networking	Support to vulnerable groups	Monitoring DESI indicators progress
Developing digital ecosystems	Training of digitalisation brokers	Peer learning	Sustainable development and responsible research	Development of Smart Villages and Local Digital Innovation Hubs
Developing adaptative governance models	Interdisciplinary training	Innovation living labs		Networking of all stakeholders
Designing policy tools for sustainable digitalisation	Multi actor co-creation groups	Innovation living labs	Prototype and project development funding	Facilitation of networking events

5. Conclusions

Overall context of digitalisation in Croatia is rather complex. Overall position of Croatia based on the indexes is a little below average when compared to other EU countries. There are exceptions like digital skill index where Croatia is ranked above average and these two things are a good reflection of the current situation. Digitalisation of services and availability of modern broadband infrastructure is satisfactory in urban areas and several service providers exist on the market. Prices for the services are higher than EU average and, in some cases, expensive in relative costs of life. Digital services (e-Government, e-Health, e-School) are continuously being developed and the Covid pandemic resulted in the very broad acceptance and public penetration of use of all available services. Further development and interconnection of all government procedures is ongoing and e-Agriculture systems is currently being made operative as well. Demographic indexes of Croatia are generally relatively negative with the same challenges as whole of Europe with population getting older with addition of emigration from the year 2013 till now. In July 2013 Croatia entered European Union and free migration of labour force was available for Croatian workers to many member states. Through the years, proscribed limits of labour force movement disappeared and many educated workers left Croatia. Estimations are that around 10% of total population (circa 400.000 people) is lost in the last 10 years (2011-2021). Depopulation is an ongoing trend but its pace is comparable to other EU countries. Majority of the people moved to other EU countries from rural areas that were underpopulated in the beginning. Although national strategies and policies regarding digitalisation put into force after 2013 identified this problem and planned appropriate interventions, their implementation was unsuccessful. Lack of human resources and skills needed for the use of public funds through open calls for infrastructure investments resulted in slow spread of broadband coverage, especially ultra-high-speed internet. During the pandemic National Recovery and Resilience Plan was put into force and following the general plan for Europe 2030 and its strategic documents (Green Deal, Digital agenda, ...) national strategies and following plans are either in force or in the final stages of approval (e.g. National Strategy for Agriculture 2030, etc.). All strategic documents identified digitalisation as one of specific goals in the sectors that they cover and specific measures are elaborated and actions plans are being created (e.g. digitalisation of agriculture is one of goals of Strategic plan for agriculture of Croatia 2021 – 2030). All shortcomings identified in period of 2015 – 2020 during the implementation of previous strategic documents were taken into account and as much as possible a change of action is planned. Legal framework for continuous progress in the overall digitalisation context is defined (or about to be defined) and it is expected that the overall digitalisation of Croatian society increases and improvement in rank based on digitalisation indexes is likely to be expected in the following years.

6. Annex

Please populate table A.1 to classify the different policies that you have analysed. Feel free to introduce new items if necessary.

6.1. Annex A

Table A.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	National CAP	National strategic plan for the new CAP period of 2023 – 2027 – draft version	Strategic plan addressing the 9 objectives of the CAP and the AKIS crosscutting objective based on the SWOT analysis and the definition of the needs and priorities of the country. Based on the needs the interventions and milestones are described and planned allocation of funds is described	National	2023 - 2027	3.422 million Euro (684,4 million Euro per year)	Public	Y	https://www.aprrr.hr/buducnost-zpp-a/
Broadband, connectivity, affordability	Connectivity in Croatia's Recovery and Resilience Plan	The Croatian plan includes two main connectivity measures to strengthen connectivity as a cornerstone of the digital transition of society and the economy.	100 Mbps services to 100,000 Croatian households (700,000 inhabitants) in 20 projects in as many local government units, to overcome in particular the connectivity barrier to teleworking and distance learning, especially in rural areas and among vulnerable groups such as students from disadvantaged families or those with disabilities; 1 Gbit services to all major socio-economic drivers such as schools, universities, research centres, transport hubs, hospitals, public administrative authorities and businesses.	National	2021 - 2025	Part of 106 million	Public	Y	https://planopovravka.gov.hr/
Creation of digital innovation ecosystems in or with influence in rural areas	National Development Strategy of the Republic of Croatia by 2030	Smart resource management, more efficient connectivity and mobility, development communal, entrepreneurial, transport and social infrastructure and related services, and by developing the concept of smart villages and encouraging the development of the local economy will be reduced depopulation processes and encourage socio-economic development of assisted and mountainous areas. An integrated and shared approach to investment will play a key role development initiatives of several local self-government units, while maintaining the central role small towns that are considered generators of development in areas particularly affected negative demographic and economic trends.	Special attention will be paid to investments in local transport infrastructure and in broadband internet. Better connectivity will contribute to the unification of economic, social, educational and social opportunities of the urban and rural population, while improving connections between centers of gravity allow easier access to international ones markets and involvement in global value chains and provide an opportunity for digital development economy and bioeconomy.	National	2020 - 2030	around 23.5 billion euros	Public	Y	file:///C:/Users/ozren.hrsto/Desktop/WP4%20National%20policy%20analysis/doma%C4%87i%20izvor/Nacr%20NRS%202030%20i%20Dodaci_samandmanom.pdf

New digital business models in rural areas, agriculture, and forestry	National Plan for the Digital Transformation of the Economy	The plan will be a strategic planning act supporting the overall implementation of the digital measures under Croatia's 2021-2030 National Development Strategy	<p>Increase the efficiency and transparency of public sector work</p> <p>Establish management and coordination structures for digital planning and verification transformations of society and public administration</p> <p>Ensure that public administration bodies have access to the tools and technology needed for development economic and better digital services tailored to the needs of their users</p> <p>Provide all citizens and entrepreneurs with access to the Internet</p>	National	2021-2027		Public	Y	https://struktur.nifondovi.hr/wp-content/uploads/2021/06/1.-Nacionalni-plan-oporavka-i-otpornosti-Digitalizacija.pdf
Funding of digitalisation (access to technologies, digital education, broadband access, etc.) in rural areas, agriculture, and forestry.	Integration of digital technology in Croatia's Recovery and Resilience Plan	Croatia's plan features a number of measures to support the integration of advanced technologies into the public and private domains. These measures include support to strengthen capacities for digital transformation through the European Centre for Innovation, Advanced Technologies and Skills Development (ECINTV) as a one-stop shop for the coordination and implementation of the relevant activities.	(i) the digital transformation of the economy; (ii) lifelong learning and development of digital and entrepreneurial skills; (iii) access to the latest knowledge and resources for testing and experimenting with digital solutions needed to develop new products, processes and business models for users; and (iv) networking and strengthening national ecosystems for digitally focused stakeholder innovation and entrepreneurship at national and European levels.	National	2021 - 2025	Part of 106 million	Public	Y	https://planoporavka.gov.hr/
National rural development networks' initiatives	Digital Literacy Development Network	provide scientific research and development guidelines in the field of Digital Citizenship, Digital Education, Work and New Occupations, and Digital Talents and Innovations will be conducted	scientific research, development guidelines in the field of Digital Citizenship, Digital Education, Work and New Occupations, and Digital Talents and Innovations	National	2020-2023	46.785.327	Public	N	https://www.odraz.hr/projects/all-projects/digital-hr/?lang=en
Digital Literacy and Digital Divide	Digital Public Services in Croatia's Recovery and Resilience Plan	The Plan includes significant investments for the digitalisation of public administration, supporting the modernisation of the digital infrastructure and the improvement of digital public services for citizens and businesses.	expand the capacity of the State cloud and integrating it into the Common European Data Spaces. The plan includes an investment to create a one-stop-shop harmonising and centralising the helpdesk system of all public administrations' online services to strengthen the interactions between citizens, business and public services. The plan also includes an investment to enable citizens to easily use online public services, by creating a mobile e-service platform, promoting the use of electronic signatures in citizens' interaction with the public administration and investments for development of digital identity card.	National	2021 - 2025	Part of 106 million	Public	Y	https://planoporavka.gov.hr/
Open data, standardisation of data, data access, etc...	Project "TODO – Twinning Open Data Operational"	This project has aims to leverage the interdisciplinary scientific excellence and innovation capacity of the University of Zagreb (UNIZG) in the field of open data to boost the supply and use of open government data in Croatia and beyond.	Objective 1: To establish an open data research environment that will facilitate and stimulate interdisciplinary multi-domain open data research within and beyond UNIZG, TUDELFT and UAEGEAN.	National	2019 - 2022	799.988,00	Public	N	https://data.gov.hr/en

		Faculty of Geodesy, University of Zagreb is coordinating this EU project	<p>Objective 2: To enhance the overall scientific R&I capacity of UNIZG significantly in the field of open data.</p> <p>Objective 3: To increase the research excellence of UNIZG, TUDELFT and UAEGEAN by collaboratively developing and applying an interdisciplinary and multi-domain open data research approach.</p> <p>Objective 4: To extend UNIZG strategic partnerships and strengthen its visibility and reputation among the national and international research community, industry, policy-makers and the general public.</p> <p>Objective 5: To secure a sustainable environment for future collaborations between UNIZG, TUDELFT and UAEGEAN.</p>						
Cybersecurity	National Identification and Authentication System (NIAS)	NIAS is a system that is the central place of identification and authentication of users when logging in to the e-service. Its basic function is to securely and reliably provide electronic identification and authentication services using credentials.	electronic identification	National	2015 -	5.200.262,00	Public	N	https://nias.gov.hr/en
Rural development networks' initiatives	LEADER Network of Croatia	The LEADER Network of Croatia is a national non-governmental association of Local Action Groups / groups and support organisations / institutions exclusively from the public and civil sector for integrated local development operating at the national level and providing professional assistance to Local Action Groups and their multi- sectoral development stakeholders.	Strengthening the capacity of LEADER / CLLD organisations and expanding LEADER / CLLD principles and methodologies in the integrated development of rural, fisheries and urban areas of the Republic of Croatia. The purpose of the action is to improve the quality of life, strengthen and connect stakeholders working in local communities, encourage the participation of women, youth and vulnerable groups in decision-making at the local and regional level, encourage cross-sectoral cooperation.	National	2012 -	-	Public	Y	http://www.lmh.hr/
	Nacionalna ruralna mreža Hrvatske	The National Rural Network (NRM) acts as a platform for networking and sharing information on the Rural Development Program to stakeholders operating in or related to rural areas. Membership in the NRM is free and non-binding, and allows members to cooperate, support and network with each other in accordance with the same goals and interests.	Networking goals are: increasing stakeholder involvement in the implementation of the Program; improving the quality of Program implementation; informing the general public and potential beneficiaries about rural development policy and possibilities for co-financing projects; encouraging innovation in agriculture, food production, forestry and rural areas.	National	2016 -	Up to 10% of allocation of Technical assistance measure for the EAFRD funds	Public	Y	https://www.mrr.hr/

