Montenegro
Digital Development Country Profile

SUSTAINABLE DEVELOPMENT GOALS
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Acknowledgements

This Digital Development Country Profile was developed by the ITU Office for Europe within the framework of the ITU Regional Initiative for Europe on Digital Innovation Ecosystems.

It was elaborated by Dr. Vujica Lazovic and Mr. Aaron Spitler, Consultants, under the supervision of Ms. Sarah Delporte, Project Officer, ITU Office for Europe and direction of Mr. Jaroslaw Ponder, Head of ITU Office for Europe. ITU would also like to acknowledge the contributions of Ms. Valentina Stadnic, Project Officer, from the ITU Office for Europe.

This Digital Development Country Profile was consulted with the United Nations Country Team of Montenegro and benefited from the contributions of FAO, UNDP and UNICEF Offices in Montenegro. In this context, ITU would also like to express sincere gratitude to all the partners that engaged in promoting the “One United Nations" approach by supporting the development of this country profile.

As digital transformation is a complex and dynamic process, this document is treated as a living document that can be amended at any point in time depending on the availability of additional information. Comments and additional inputs should be sent to the ITU Office for Europe (EURregion@itu.int).

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1. Introduction

1.1 Background and Context

Development through digital transformation is a complex issue and touches on many enablers, from broadband availability to policies and sectoral e-strategies, as well as specific programmes fostering digital inclusion or the development of innovative communities.

Various independent research projects have been carried out by the International Telecommunication Union (ITU), United Nations (UN) agencies, and stakeholders in understanding these enablers, their impact on countries, the gaps, and opportunities. However, these studies may not reflect the inherent interdependencies among them. There is a need to provide a simple view and narrative about a country's capacity to digitally transform, and the various components contributing to this process.

Digital development has become ever more important since the outbreak of the coronavirus (COVID-19) pandemic, and various UN agencies and other stakeholders have assisted countries in their respective capacities relying substantially on the digital component.

Extending the availability of products and services, and empowering citizens, workers, and students in their daily engagements and needs during times of lockdown have become clear priorities in all countries. The ability to leverage the progress made in the digital sphere has become an important factor in determining resilience during the COVID-19 crisis and its extended aftermath.

As the situation is settling into a "new normal," where digital is not only a solution to an emergency but a long-term investment against risk, it is necessary to unpack the various dimensions of digital development in different countries as information and communication technologies (ICTs) become increasingly important for achieving the Sustainable Development Goals (SDGs) by 2030.

1.2 Objective of the Report

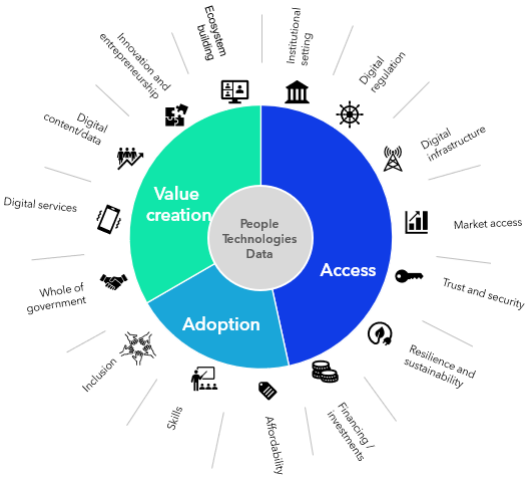
The aim of the Digital Development Country Profiles series is to provide a comparative analysis for the countries of the European region with UN in-country presence, namely Albania, Bosnia and Herzegovina, Georgia, Moldova, Montenegro, North Macedonia, Serbia, and Ukraine.

The report addresses digital transformation based on the various experiences of the ITU, the UN specialized agency for ICTs, and other UN system organisations, offering a broad overview of the activities and projects being implemented at the national level and throughout the wider region.

The document seeks to create a reference for discussions on digital development at the country level in Montenegro. It will serve as a guide for future dialogue with country stakeholders and pave the way for increasing fit-for-purpose engagements of the UN system in the country. It will equip decision-makers at the national level, as well as international stakeholders, with an overview of the various components of digital development at the country level.

1.3 Methodology

The research has identified a *three-building block framework* that analyses digital transformation from a variety of perspectives, enabling an understanding of how the various dimensions of digital development interact at the country level. Below is a summary of each building block and an elaboration of how the particular dimension fits in the overall digital development scenario of the country. The figure on the side demonstrates a visual representation of the framework, with its building blocks and related components.



1) Access: Robust ICT infrastructure represents a critical precondition for the transformation of a country. It provides the foundation for innovative services and economic activity to take place. With the COVID-19 pandemic, countries and communities lacking connectivity faced a greater disruption than those who did not, therefore raising the overall importance of reliable and safe infrastructure and services that are available to all. ICT infrastructure needs to be evaluated based on several aspects critical to meaningful connectivity. Government holds a central role in promoting the right strategies collaboratively across various entities. This includes setting in place the conditions for the ideal mix of policies and regulations to facilitate attainment of universal and affordable connectivity through resilience infrastructure deployments, ensuring ubiquitous network coverage that includes “last mile” and hardest-to-connect under-resourced areas.

2) Adoption: Developing digital skills and building human capacities to empower citizens, strengthen employability, and create new job opportunities is essential to match the needs of the gigabit society. The pandemic has exacerbated pre-existing inequalities, especially among refugees, migrants, persons with disabilities, women, and girls. While connectivity is the backbone of digital transformation, adopting a “people-centric” digital transformation is vital to ensure that all members of society are not only connected but meaningfully connected and, thus, fully enjoy the fruit of an ever-growing digital world. To this end, special emphasis should be given to bridging the digital divide and equipping all groups in society, including those with specific needs, to take advantage of ICTs by accelerating digital skills development.

3) Value Creation: Access to government services by citizens enables productivity, transparency, and equality in digital development. Ensuring that public services are delivered digitally is an important component of digital transformation, triggering a reduction in costs and bureaucracy all while increasing efficiency. Governments also have an important role in guaranteeing that public sector transformation becomes a catalyst for digital transformation in the wider economy. Most economic benefits accumulate when ICTs are also used to transform other sectors, such as agriculture or health, which are key to unlock job creation and economic inclusion. Going beyond the digitalisation of sectors, there is a need to create an enabling environment supporting digital innovation to accelerate digital transformation within a particular country. The ability to digitally innovate domestically is also considered a sign of maturity which leverages the two building blocks addressed previously. Without entrepreneurship-driven innovation, economic opportunities will remain unexplored and the global competitiveness of countries in an increasingly digital landscape is placed at risk. Through strong digital innovation ecosystems, countries can benefit from increased productivity, economic growth, and employment opportunities that catalyse digital transformation while ensuring that long-term digital development has a positive impact on a country's broader economic development.

The country profiles benefitted from secondary research, including various ITU publications, activities, and statistics. Moreover, content generated by other stakeholders, including reports and publications, was incorporated into the document. Each piece of information is presented using the context of the relevant building block under which the details have been inserted, and therefore adopts one of the three perspectives on digital transformation.

2. Country Profile – Montenegro

2.1 Building Block 1: Access

Broadband development is of primary importance and remains a prerequisite to ensure digital development. It is the backbone for every aspect of the economy, acting as a fundamental enabler for businesses, consumers, and citizens. Safe and reliable access to the next generation of infrastructure (fixed, mobile, wireless, and satellite) as well as ICTs are necessary for advancing sustainable development. Creating the right conditions for digital technologies to be broadly utilized will accelerate economic growth throughout the wider region. From revamping institutional practices to revising legal frameworks, expanding digital access to all demographic groups must be prioritized.

This section will provide a general overview of i) the institutional setting in charge of policymaking efforts related to ICTs and digital development; ii) rules and regulations related to digital; iii) the current state of digital infrastructure; iv) market dynamics; v) security matters; vi) system resilience; and vii) funding structures and measures to attract investment.

2.1.1 Institutional Setting

There are a number of agencies whose work revolves around digital and ICT development in Montenegro. While their mandates may vary, these organisations collaborate to ensure that policies are harmonized.

The main role in creating and implementing of the digital development policies[1] in Montenegro have the following institutions:[2]

- Ministry of Economic Development and Tourism, Directorate of Electronic Communications, Postal Service and Radio-Spectrum;
- Ministry of Economic Development and Tourism, Directorate for Internal Market and Competition
- Ministry of Public Administration, Directorate for Infrastructure, Information Security, Digitalization and E-Services;
- Ministry of Science and Technological Development, Directorate for Innovations and Technological Development;
- Ministry of Health;
- Directorate for the Protection of Secret Data;
- Public Procurement Administration of Montenegro;
- Agency of Electronic Communications and Postal Services (EKIP).

Also, in accordance with their main activities and responsibilities, the supporting role in achieving the targets of the digital policies have other public institutions as:

- Statistical Office (MONSTAT);
- Ministry of Finance;
- Ministry of Defense;
- Ministry of Internal Affairs;
- Intellectual Property Office.

With the aim of coordinating of the policies in some segments of the digital development, the Montenegrin government established a number of advisory bodies like:

- Council for Electronic Government;
- Council for Information Security;
- Council for innovation and smart specialization;
- Council for Competitiveness;
- Council for Public Administration Reform;
- Council for managing an open data portal.

[1] Analysis of Montenegro's Digital Government Legal Framework, UNDP Montenegro (2022), https://www.undp.org/montenegro/publications/analysis-montenegros-digital-government-legal-framework
[2] Regulation on the organization and mode of working of the state administration (2022), https://metrologija.me/wp-content/uploads/zakonodavstvo/ostalo/Uredba-o-organizaciji-i-nacinu-rada-drzavne-uprave.pdf (Montenegrin).

The following organizations also play a significant role in the process of digital development in Montenegro[3]:

- Committee of Chamber of Commerce for ICT;
- ICT Cortex;
- Innovation Fund;
- Committee for digital transformation – Montenegrin Association of Managers;
- Committee for digital transformation - American Chamber of Commerce in Montenegro;
- Committee for digital transformation - Union of Employers of Montenegro;
- Committee for information-communication technologies - Council of foreign investors in Montenegro;
- Society of Informatics of Montenegro;
- Montenegrin Academy of Sciences and Arts (CANU).

Within the project "E-services and digital infrastructure as a response to Covid-19" funded by the European Union, and implemented by UNDP in cooperation with the Ministry of Public Administration, Digital Society and Media, the *Assessment of the Montenegrin institutional framework for digital governance*[4] was conducted. The aim of the analysis was to assess the readiness of institutions and authorities for digital transformation in Montenegro.

Despite the variety of actors involved in this domain, the environment for regulation the process of digital development in Montenegro is fragmented. Not only is coordination between entities at the central and local levels lacking; there is also confusion regarding the responsibilities of each agency. Therefore, it is critical that these stakeholders improve their cooperation in order to equip Montenegrin citizens to adjust to the digital economy.[5]

In 2020, UNDP Montenegro in *National Human Developement Report* [6] proposed establishing a coordination body for the development of digital solutions, which was also supported by business sector. That idea is recognized in the *Montenegro Digital Transformation Strategy 2022-2026*[7]. In line with the idea, as an example of successful implementation of this solution, an overview of existing coordinating bodies in other European countries was prepared. Through this initiative, it was proposed that the coordinating body involve all relevant stakeholders (business, public sector, and academia) and that they

[3] Analysis of the Montenegrin ICT sector in 2022 (2022), http://help-montenegro.org/wp-content/uploads/2023/07/Montenegrin_IT_sector_Analysis.pdf.
[4] Assessment of the Montenegrin institutional framework for digital governance, UNDP Montenegro (2022), https://www.undp.org/montenegro/publications/assessment-montenegrin-institutional-framework-digital-governance
[5] Digital Innovation Profile – Montenegro, ITU (2020), https://www.itu.int/dms_pub/itu-d/opb/inno/D-INNO-PROFILE.MONTENEGRO-2020-PDF-E.pdf.
[6] For more information, visit the following link: https://buducnostzasve.me/
[7] Montenegro Digital Transformation Strategy 2022-2026 with Action Plan 2022-2023 (2022), https://wapi.gov.me/download/59dcab9b-b0e8-48b7-830b-6e4eab690521?version=1.0.

define measures for successful digital transformation, together, through dialogue.[8] The *Coordinating body for the management of the digital transformation process* was established in February 2023 by the Government of Montenegro.

2.1.2 Digital Regulation

Connectivity policies and regulations

At present, Montenegro has pursued a variety of interventions to advance connectivity in the country. The centerpiece of these efforts is the *Montenegro Digital Transformation Strategy 2022-2026*, which includes specific targets for expanding broadband access and strengthening digital infrastructure.

The Agency for Electronic Communications and Postal Services (EKIP) is the agency that is leading the way in terms of connectivity policy. In recent years, they have led the government-wide effort to transition from Internet protocol version 4 (Ipv4) to Ipv6[9], with the support of the ITU, leading to the opening of an Ipv6 Laboratory.[10]

The basic principles by which the Agency is guided in the procedures for regulating the electronic communications sector and postal activities are: ensuring a safe and predictable environment for the business of operators and their investments, ensuring the conditions for the implementation and development of new technology in the entire territory of Montenegro, while encouraging the rational use of limited resources (radio frequencies and numbers/addresses), encouraging competition while preventing distortion of market competition between operators, resolving disputes between operators, protecting the interests of users and its constant improvement.

Looking at the wider regulatory environment, Montenegro earned a 93.0 out of 100 in the 2022 edition of the ITU *ICT Regulatory Tracker* rankings.[11] This tracker highlights general developments in the regulatory environments of participating countries. The Tracker also facilitates benchmarking and identifying trends and gaps in ICT legal regulatory frameworks. This, in turn, equips decision-makers with the information they need to argue for reforms that bolster the vibrancy of the ICT sector. To accomplish this goal, the database creates a comprehensive metric incorporating nearly 50 indicators. Findings are then grouped into four main "clusters." These categories are listed below:

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[8] Montenegro Digital Transformation Strategy 2022-2026 with Action Plan 2022-2023 (2022), https://wapi.gov.me/download/59dcab9b-b0e8-48b7-830b-6e4eab690521?version=1.0.

[9] For more information on these efforts, visit the following link: https://ekip.me/page/regulation/strategije-i-planovi/content.

[10] Learn more about ITU technical assistance to Montenegro on Ipv6 at: https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Pages/Events/2023/0927%20-%20ITU%20Technical%20Assistance%20to%20Montenegro%20on%20IPv6%20Opening%20of%20the%20IPv6%20Laboratory/ITU-Technical-Assistance-to-Montenegro-on-IPv6-Opening-of-the-IPv6-Laboratory--.aspx

[11] ITU Regulatory Tracker, ITU (2022), https://app.gen5.digital/tracker/country-cards/Montenegro.

1. Regulatory authority (focusing on the functioning of the regulatory entity): Montenegro received an 18 out of 20;
2. Regulatory mandates (who regulates what): Montenegro scored a 19 out of 22;
3. Regulatory regime (what regulation exists in major areas): Montenegro earned a 28 out of 30;
4. Competition framework for the ICT sector (levels of competition in the main market segments): Montenegro attained a 28 out of 28.

Reflecting on these findings, Montenegro is one of the countries with a *Fourth-Generation regulatory regime (G4)*, that is integrated and led by economic and social policy goals. The country's score for 2022 is higher than the 2022 results for Europe (87,2%) and the world (39,6%).

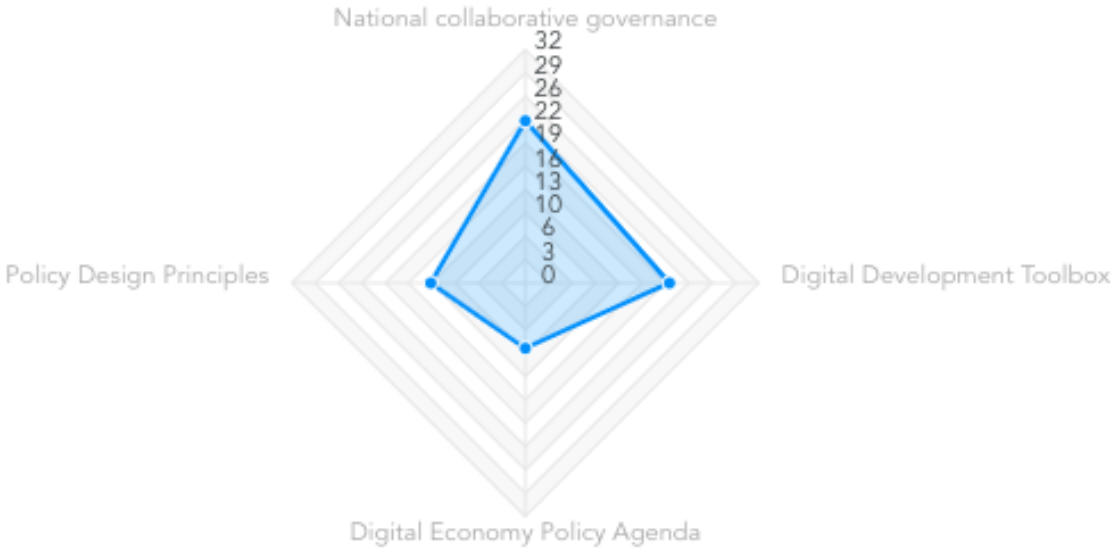
Figure 1. ICT Regulatory Tracker – Montenegro (2022)[12]

Presently, the gold standard for regulatory policy is the *Fifth-Generation (G5)*, which is focused on collaboration amongst diverse stakeholders within the ICT space. This framework also examines the

[12] ITU Regulatory Tracker, ITU (2022), https://app.gen5.digital/tracker/country-cards/Montenegro.

sustained and reliable engagement of these parties within the wider global economy. For Montenegro, the country has made significant strides in this field. Montenegro received an overall score of around 63.89 in 2021, close to Europe's 2020 result of 69.9.[13] While these metrics indicate progress, leaders in Montenegro should strive to improve their performance in categories such as Pillar II (Policy Design Principles) and Pillar IV (Digital Economy Policy Agenda).[14] Pillar II stood at 12.96 out of a maximum of 20, whereas the score for Pillar IV was much lower at 8.95 out of a maximum of 22.[15]

Figure 2. G5 Benchmark – Montenegro (2021)[16]



Next generation infrastructure: 5G Regulations

The Law on the use of physical infrastructure for setting up high-speed electronic communication networks was adopted in 2022. By adopting the law, the obstacles to the installation of these networks are removed. This is primarily related to high construction costs, inefficient and irrational use of the existing infrastructure, the absence of a single database on the existing physical infrastructure, as well as

[13] The Benchmark of Fifth Generation Collaborative Regulation, ITU (2021), https://digitalregulation.org/wp-content/uploads/G5Benchmark_ReviewBoardReport_21062021.pdf.
[14] The Benchmark of Fifth Generation Collaborative Regulation, ITU (2021), https://digitalregulation.org/wp-content/uploads/G5Benchmark_ReviewBoardReport_21062021.pdf.
[15] The Benchmark of Fifth Generation Collaborative Regulation, ITU (2021), https://digitalregulation.org/wp-content/uploads/G5Benchmark_ReviewBoardReport_21062021.pdf.
[16] ITU Regulatory Tracker, ITU (2022), https://app.gen5.digital/tracker/country-cards/Montenegro.

the lack of coordination during construction for the installation of high-speed electronic communication networks.

EKIP launched the "Study on strategy for implementation of 5G networks in Montenegro" in 2021, which seeks to identify the barriers to adopting 5G technologies[17] and will form the basis of the national strategy for 5G deployment. To achieve this goal, the study has identified activities that can be implemented by authorities across the government to promote the use of this technology. While the initiative prioritises the role of EKIP, it also calls for coordination among all ministries whose mandates relate to telecommunications.

Using this study, EKIP developed an eight-step action plan for creating 5G networks, as follow[18]

1. Harmonization of Montenegro's regulatory framework with EU framework;
2. Allocation of adequate radio-frequency resources;
3. 5G pilots and test projects deployment;
4. Spectrum auction;
5. Amendments to legislative framework for infrastructure construction and deployment of electronic communication networks;
6. Arising awareness of benefits and adequate communication of risks;
7. Implementation of European Union Agency for Cybersecurity (ENISA) regulation regarding cyber security;
8. Capacity building within all stakeholders.

Beyond the action plan, there are other strategic documents that are guiding 5G policymaking. These materials are designed to help modernize the infrastructure for communications in the country. A few of these resources can be found in the list below:[19]

- Action Plan on Establishment of Common Regional Market (CRM);
- Memorandum of Understanding on 5G Digital Transformation Plan for the Western Balkans;[20]
- Roadmap on introduction of 5G mobile communication networks[21];
- Cybersecurity Strategy of Montenegro 2022-2026 with Action Plan for the period 2022-2023[22]

[17] For more information on the 5G network in Montenegro, visit the following link: https://www.ekip.me/page/radio-frequencies/radio-frequency-spectrum/assignmentuse/5g-network.
[18] For more information on government-led study, visit the following link: https://aek.mk/wp-content/uploads/2022/05/5.-Developing-5G-ecosystem-in-MNE.pptx.
[19] For more information on government-led study, visit the following link : https://aek.mk/wp-content/uploads/2022/05/5.-Developing-5G-ecosystem-in-MNE.pptx.
[20] For information on this memorandum, which was signed at the Regional Cooperation Council's 2020 Western Balkans Digital Summit in Tirana, visit the following link: https://www.rcc.int/events/1400/rcc-supports-one-of-the-regions-most-prominent-events-western-balkans-digital-summit.
[21] Roadmap on introduction of 5G mobile communication networks (2021), https://www.ekip.me/media/documents/general/1642154883_2022%2001%2013%20Mapa%20puta%20za%20uvo%C4%91enje%205G.pdf (Montenegrin).
[22] Cybersecurity Strategy of Montenegro 2022-2026 (2022), https://wapi.gov.me/download-preview/2416dd90-e512-4e51-a050-2556276f31bb?version=1.0 (Montenegrin).

- Strategy on implementation of 5G mobile communication networks in Montenegro 2023-2027, with the Action Plan 2023-2024[23];

In previous years, the agency undertook a series of concrete activities with the aim of introducing 5G technology by the end of 2022 and creating conditions for the accelerated development of 5G networks in the coming years.

By the beginning of 2021, the technical and regulatory framework for the use of radio frequencies for the implementation of 5G mobile networks, both in the bands already assigned to mobile operators and in the pioneering 5G bands, was adopted. Then, at the beginning of 2022, the procedure for allocating free radio frequencies from the 2 GHz and 2.6 GHz bands was completed, which gave mobile operators the opportunity to use part of the resources they currently have for the implementation of 5G technology with the application of dynamic spectrum sharing (DSS) techniques.

The mobile operators Crnogorski Telekom, and One Montenegro respectively launched in March 2022 and July of 2022 a 5G network based on dynamic spectrum sharing - DSS technology. The mobile operator Crnogorski Telekom put into operation 93 NR (DSS) radio base stations by the end of June 2023, and is servicing 5G in almost all municipalities in Montenegro, except for two (Šavnik and Petnjica), which covers a territory where around 77.5 per cent population live. As for One Montenegro, at the end of June 2023, 37 NR (DSS) radio stations were active, and 5G services are available in a territory where around 55 percent of the population lives. At the end of June 2023, together with Mtel, the three mobile operators cover 5G network services in an area where about 79 per cent of the Montenegrin population lives.

In April 2022, the mobile operators Crnogorski Telekom and One Montenegro, and in July of the same year the mobile operator Mtel, were issued teeemporary approvals for the use of radio frequencies from the 3.6 GHz range for the implementation of 5G pilot projects in order to test 5G technology. The tests lasted until the approval for the use of radio frequencies from this range was granted, which was issued in February 2023.

In parallel with the mentioned activities, the Agency was preparing the procedure for the allocation of radio frequencies from the pioneering 5G bands. The public tender for granting approval for the use of radio frequencies from the 700 MHz, 3.6 GHz and 26 GHz bands for the implementation of public mobile electronic communication networks was conducted in the period October-December 2022. The approvals for the use of radio frequencies of 700 MHz and 3.6 GHz were released to mobile operators in February 2023. Radio frequencies from the 26 GHz band remained unassigned. In March 2023, the mobile operators Crnogorski Telekom and One Montenegro, and in May 2023 the operator Mtel, launched the first NR radio base stations in the 3.6 GHz band into commercial operation. By assigning radio frequencies from the pioneering 5G bands, primarily from the 3.6 GHz band, conditions are created for the development of 5G networks that enable data transmission at speeds of the order of Gb/s, and at a later stage, other services characteristic of 5G.

[23] The adoption of this document by the Government of Montenegro is expected by the end of 2023.

2.1.3 Digital Infrastructure

According to the latest data available, it is estimated that 88.2 per cent of individuals in the country used the Internet in 2022, close but below the European average of 89.5 per cent.[24] Additionally, there are around 103 active mobile-broadband subscriptions per 100 inhabitants in Montenegro, and still below to the European average of 110.[25] As for network coverage, approximately 98 per cent of the population has 3G connectivity.[26] This is on par with European averages (estimated at 100 per cent) and higher than global standards (nearly 96 per cent).[27] Lastly, the report lists that there were about 31.3 (fixed) broadband subscriptions per 100 inhabitants, being below the average in Europe (35.4 subscriptions per 100 inhabitants).[28] In sum, while Montenegro has seen its efforts to expand connectivity and exceed all world averages, there are areas where improvements are needed to keep pace with the European averages.

Table 1 provides a useful summary of ITU indicators related to telecommunications and the internet for Montenegro. It also draws comparisons to European and global standards.

Table 1. Telecommunications and Internet Indicators in Montenegro alongside European and World Averages

Key Indicators (2022)	Montenegro	Europe	World
Fixed telephone subs per 100 inhabitants	31	30.9	13.9
Mobile cellular subs per 100 inhabitants	178.4	120.9	111.5
Active mobile broadband per 100 inhabitants	100	110	87
3G Coverage (% of population)	98	99.6	94.8
Individuals using the Internet (%)	88	90	66
Households with Internet Access (%)	81	88*	66*
Fixed broadband subs per 100 inhabitants	31.3	35.4	17.6
Fixed broadband subs by speed (% of distribution):	--		
256 kbit/s to 2 Mbit/s	0.8**	0.3*	1.8*
2 to 10 Mbit/s	12.55**	6.4*	6.7*
>> 10 Mbit/s	86.01**	92.3*	89.9*

* 2020 Data (latest official data available)
** 2022 Data for Montenegro (Report on the development of the electronic communications market, EKIP)[29]

[24] World Telecommunication/ICT Indicators Database 2023 – Retrieved September 2023, ITU (2023), https://datahub.itu.int/data/?e=MNE&c=701&i=11624.
[25] Digital Development Dashboard – Retrieved September 2023, ITU (2023), https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx.
[26] World Telecommunication/ICT Indicators Database 2023 – Retrieved September 2023, ITU (2023), https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx.
[27] World Telecommunication/ICT Indicators Database 2023 – Retrieved September 2023, ITU (2023), https://datahub.itu.int/data/?e=MNE&c=701&i=11624.
[28] World Telecommunication/ICT Indicators Database 2023 – Retrieved September 2023, ITU (2023), https://datahub.itu.int/data/?e=MNE&c=701&i=11624.
[29] For more information, visit the following link: https://wapi.gov.me/download-preview/12c83982-7aba-40c0-82f0-172fc432e646?version=1.0 (Montenegrin).

According to *The Status on Connectivity in 9 Non-EU Countries of Europe Region*, a report issued by ITU in 2021, Montenegro is a leader among studied countries in terms of *availability* of connectivity. A trio of indicators are useful for understanding the situation on the ground:

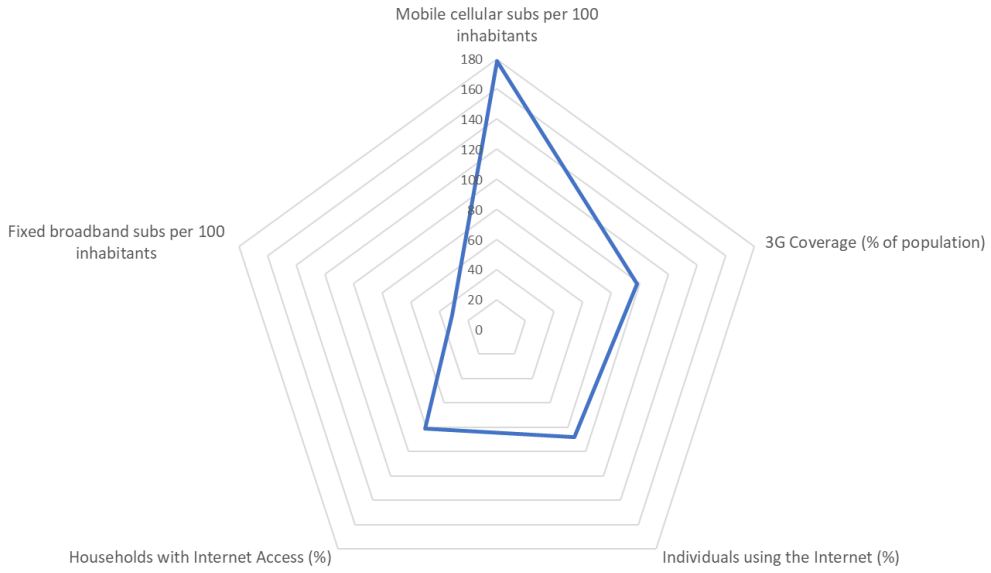
1. Percentage of the population covered by at least an LTE/WiMAX mobile network: In 2022 the coverage with LTE/WiMAX mobile-broadband networks in Montenegro was 97.9 per cent, and it is still behind the European average (98.8 per cent).
2. Estimated proportion of households with internet access at home: approximately 81 per cent of households in Montenegro were connected to the internet in 2022.[30] The country is behing the Europe average (87.6 per cent) as third among the 9 countries of ITU's Europe region.
3. Number of fibre connections per 100 inhabitants: Montenegro has approximately 10.0 fibre-to-the-home (FTTH) linkages per 100 inhabitants.[31] They are fourth among the 9 countries in ITU's Europe region. In addition to exceeding the average for the non-EU group (6.5 connections per 100 inhabitants), the country also surpasses the EU's 2019 rate (8.7 connections per 100 inhabitants).

Figure 3, which can be found below, looks at basic indicators of ICT access in Montenegro for the following years: 2017, 2018, 2019, and 2020.

[30] World Telecommunication/ICT Indicators Database 2023 – Retrieved September 2023, ITU (2023), https://datahub.itu.int/data/?e=MNE&c=701&i=11624.

[31] The Status of Connectivity in 9 Non-EU Countries of Europe Region, ITU (2021), https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2021/Meaningful%20Connectivity/Report%20-%20The%20Status%20of%20Connectivity%20in%209%20non-EU%20countries%20of%20Europe%20region_final_clean.pdf.

Figure 3. Basic indicators of ICT access and usage in Montenegro (2022)



The Government of Montenegro understood the importance of establishing a reliable infrastructure as a prerequisite for the successful digital transformation. Thus, in recent years it showed progress when it comes to establishing of basic information systems that represent the basis for providing of the quality e-services and their full digitialisation[32].

Such example is the Platform of the Unified Information System for Electronic Data Exchange (SISEDE) of the Government Service, also called the Unified System of Electronic Data Exchange (JSERP), which was put into operation at the end of 2018. The primary goal of this system is to ensure communication between existing systems and a faster exchange of information between citizens and the administration, enabling the provision of services electronically and the automated exchange and use of large amounts of data from state registers. The basic function of a central, interoperable system is to provide institutions with a unique communication platform for safe and reliable data exchange and thus provide a basis for quality and fast delivery of services.

[32] Montenegro Digital Transformation Strategy 2022-2026 with Action Plan 2022-2023 (2022), https://wapi.gov.me/download/59dcab9b-b0e8-48b7-830b-6e4eab690521?version=1.0.

The Ministry of Public Administration, Digital Society and Media (now the Ministry of Public Administration), as a state administration body responsible for electronic administration and electronic business, has initiated the implementation of two information systems, namely:

1. The Information System for Electronic User Identification (NS eID) which must integrate trust services from various certified trust service providers. This information system aims to enable electronic identification, i.e. authentication and authorization of users when using electronic services.
2. The Information System for the Collection of Administrative Fees (NS - NAT) which should enable the electronic payment of public revenues. The goal of introducing the system is to eliminate the existing problems of public revenue collection by introducing a central place for monitoring through the payment of public revenue services with payment cards at the counters of state administration bodies and local self-government units, as well as payment cards through the portal for the provision of electronic services.

Additionaly, the electronic document management system (eDMS) represents one of the key government services that enables the improvement of business processes by gradually moving from paper to electronic document management. The goal of implementations of eDMS in state administration bodies is to create a more efficient, high-quality and transparent electronic administration. The system enables faster exchange of information, reduction of paperwork and greater security when storing documents.

2.1.4 Market Access

Policy related to telecommunications in Montenegro is largely shaped by measures implemented in the European Union. For instance, the *Montenegro Digital Transformation Strategy 2022-2026* is following numerous European documents that recognize and define the targets for reaching digital development. Thus, having in mind the importance of developing and strengthening broadband access, the Strategy recognised that expanding the availability of fixed broadband access as well as the introduction and wider spread of 5G services are the key items for accelerated and qualitative progress as well as to approach the goals of the EU in that regard, stated in the document *Connectivity for a European Gigabit Society*[33].

Additionally, EKIP was designed to supervise these projects. The agency's long-term efforts, namely the push to allow roaming throughout the Western Balkans (WB), borrows heavily from telecom policy in EU countries.[34] Another successful example of regional cooperation is the EU/WB Roaming Declaration, signed at the EU/Western Balkans Summit[35], which was held in Tirana, Albania, on December 6, 2022, by telecommunications operators from the Western Balkans and the EU. This achievement is based on the

[33] For more information, visit the following link: https://digital-strategy.ec.europa.eu/en/library/connectivity-european-gigabit-society-brochure.
[34] For more information on this policy, which was agreed to in 2018 and came into effect in 2021, visit the following link: https://apnews.com/article/europe-business-3da8f07ab1b9b739839bfe3f0590a7a2.
[35] Learn more about the EU/Western Balkans Summit at: https://www.consilium.europa.eu/en/meetings/international-summit/2022/12/06/

successful implementation of the "roaming at home" (RLAH) regime, which has been implemented in the Western Balkans region since July 1, 2021.

These reforms support the country in their journey to EU accession.[36]

Presently, there are three companies that dominate the telecom market. The foreign company One Montenegro (previously known as Telenor until 2022) is long-established within the market.[37] Crnogorski Telekom, a company of Croatian-based Hrvatski Telekom that is affiliated with Germany's Deutsche Telekom, is also a major player in the communications industry.[38] Finally, Mtel, which is jointly owned by Telekom Srbija and Telekom Srpske, rose to prominence in 2007 and has become a force in the industry.[39] Statistics from May 2023 indicate that Crnogorski Telekom leads the pack with 40.14 per cent of the market, followed closely by both Mtel (33.96 per cent) and One Montenegro (25.91 per cent).[40] All things considered, these three companies have helped improved mobile-broadband penetration, though national rates still lag behind EU averages.[41]

In addition to the report on the mobile telephony market, EKIP publishes other data about the electronic communication market, for the following segments:

1. Fixed telephony market
2. Internet and broadband access market
3. AVM content distribution market
4. FTTx connections

[36] Measuring the Information Society Report – Volume 2, ITU (2018), https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2018/MISR-2018-Vol-2-E.pdf.
[37] For more information on One Montenegro, visit the following link: https://www.1.me/cg/o-kompaniji/ (Montenegrin).
[38] For more information on Crnogorski Telekom, visit the following link: https://www.telekom.com/en/company/worldwide/profile/profile-montenegro-355844#:~:text=Crnogorski%20Telekom%20is%20the%20largest,marketed%20under%20the%20T%2D%20brand.
[39] For more information on m:tel, visit the following link: https://mtel.me/O-mtelu/O-nama (Montenegrin).
[40] EKIP's Monthly report (May 2023), https://ekip.me/media/documents/general/1688382001_Mobilna%20-%20maj.pdf (Montenegrin).
[41] Measuring the Information Society Report – Volume 2, ITU (2018), https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2018/MISR-2018-Vol-2-E.pdf.

Figure 4. Participation of Internet users in relation to the type of technology use and the category of users[42]

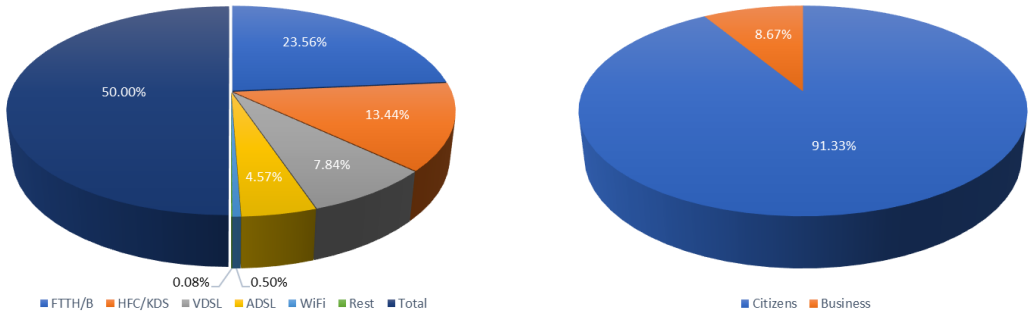
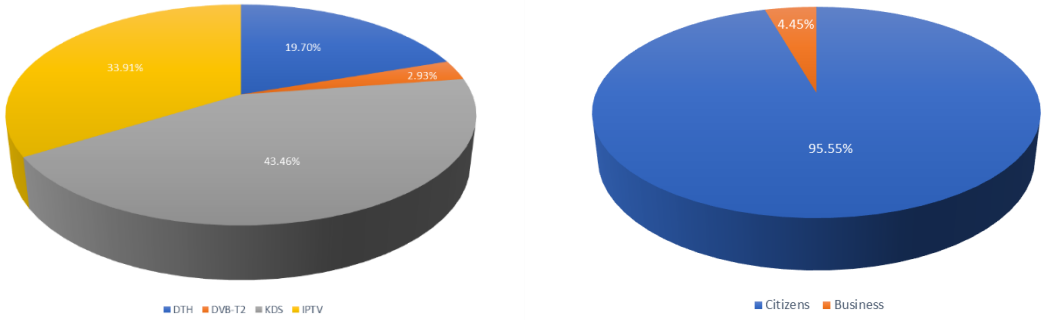


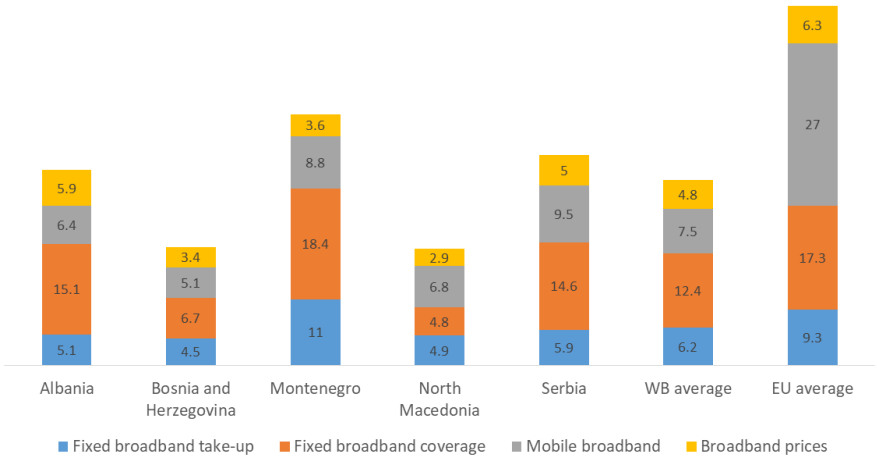
Figure 5. Participation of platforms for distribution of AVM content according to the number of connections and the categorys of users[43]



According to the DESI index (Digital Economy and Society Index)[44], the data for 2022 shows that with 35,1, Montenegro has the highest scores among the Western Balkans DESI scores. It is followed by Serbia (34,9), Albania (32), North Macedonia (27,4) and Bosnia and Herzegovina (23,3). The average score of DESI for the Western Balkan countries is of 29.7, while for the Europe region it is 52,3.

[42] EKIP's Monthly report (May 2023), https://ekip.me/media/documents/general/1688382001_Mobilna%20-%20maj.pdf (Montenegrin).
[43] EKIP's Monthly report (May 2023), https://ekip.me/media/documents/general/1688382001_Mobilna%20-%20maj.pdf (Montenegrin).
[44] Western Balkans Digital Economy Society Index, WB DESI 2022 Report (2022), https://www.rcc.int/pubs/159/western-balkans-digital-economy-society-index-wb-desi-2022-report.

Figure 6. Connectivity sub-dimensions, WB DESI 2022[45]



2.1.5 Trust and Security

According to the 2020 ITU Global Cybersecurity Index, Montenegro ranks 87th out of 182 participating countries,[46] and 41st out of the 46 countries of the Europe region.[47] This index is a trusted reference that measures countries' commitment to cybersecurity at the global level. Moreover, it draws attention to the multiple dimensions of this field. For instance, the index reveals that Montenegro is well positioned in implementing cooperative measures within the international cyber space. However, it also underscores insufficient capacity development as a problem which undermines domestic network security. In short, reforms must be implemented to improve the state of cybersecurity in the Balkan country.

Montenegro has also pursued other means to improve the security of its e-infrastructure. For instance, it is a party to the Budapest Convention on Cybercrime.[48] The country signed the treaty in April 2005 and saw it come into effect in July 2010.[49] Since May 2022, the Government is also signatory to the Second Additional Protocol to the Convention on Cybercrime on enhanced co-operation and disclosure of electronic evidence, which support countries party to the Council of Europe to improve coordination on cybercrime investigations.[50]

[45] Western Balkans Digital Economy Society Index, WB DESI 2022 Report (2022), https://www.rcc.int/pubs/159/western-balkans-digital-economy-society-index-wb-desi-2022-report.
[46] Global Cybersecurity Index 2020, ITU (2021), https://www.itu.int/dms_pub/itu-d/opb/str/D-STR-GCI.01-2021-PDF-E.pdf.
[47] Global Cybersecurity Index 2020, ITU (2021), https://www.itu.int/dms_pub/itu-d/opb/str/D-STR-GCI.01-2021-PDF-E.pdf.
[48] For a full list of participating countries, visit the College of Europe's website on the Budapest Convention: https://www.coe.int/en/web/cybercrime/the-budapest-convention.
[49] For more information, visit the following link: https://www.coe.int/en/web/conventions/full-list?module=signatures-by-treaty&treatynum=185.
[50] For more information, visit the following link: https://www.coe.int/en/web/conventions/full-list?module=signatures-by-treaty&treatynum=224.

With the support from the Republic of France and Republic of Slovenia, in November 2022, the Government of Montenegro signed the Letter of intent for establishing the Regional Center for Cyber Security and Development of Cyber Capacity (WB3C) for the Western Balkan countries. The Regional center will have the legal status of an international organisation with the aim of gradually opening it up to other countries of the Western Balkans that want to join it. At the end of 2022, the Government of Montenegro appointed a Steering Committee of the Regional Center for Cyber Security and Development of cyber capacity (WB3C) for the Western Balkans.

In August 2022, Montenegro faced continuous cyber-attacks of the high intensity and complexity, targeting Government IT network and infrastructure. With the aim to better the organisation and provision of cyber security at the level of the Government network and infrastructure, in December 2022, a new Directorate for Information Security - Government CIRT was established. The UNDP Montenegro supported the development of CIRT's new website[51]. The role of the Government CIRT is to monitor the established cyber ecosystem 24/7 and to respond to everyday threats of the sophisticated cyber-attacks, in order to raise the security of the Government information infrastructure and information and communication network of the governmental bodies, and also to help stop cyber-attacks in early phases, help a quick system recovery and the preservation of data integrity.

The new Cybersecurity strategy of Montenegro 2022-2026[52], set the main goals that are aligned with standards set by the EU[53] and the Cybersecurity strategy of the European Union 2020-2025, which sets priorities in the direction of building European resilience, autonomy, leadership and operational capacities in dealing with complex threats to network and information systems, as well as the improvement of global and open cyber space and international cooperation. The strategy proposes the revision of the NIS Directive, i.e. the adoption of the NIS 2 Directive and the new Directive on the resilience of critical entities, which is in line with the European Commission's priority to make Europe ready for the digital age.

These priorities have had a major role in guiding policymaking efforts. Specifically, they have helped determine the main goal of the Cybersecurity strategy of Montenegro 2022-2026, whose targets include:[54]

- Further strengthening of the cybersecurity capacities in the sense of providing adequate human and financial resources as well as meeting other needs necessary for efficient and agile cyber capacities of Montenegro institutions aimed at ensuring safe cyberspace, providing business incentives and ultimately contributing to the economic prosperity of Montenegro;
- Undertake activities with a view to centralising and gathering expertise in the field of cybersecurity in order to: strengthen capacities for the purpose of responding efficiently to

[51] For more information, visit the following link: www.cirt.gov.me.
[52] Cybersecurity Strategy of Montenegro 2022-2026 (2022), https://wapi.gov.me/download-preview/2416dd90-e512-4e51-a050-2556276f31bb?version=1.0 (Montenegrin).
[53] National Cybersecurity Strategies in Western Balkan Economies, Geneva Centre for Security Sector Governance (2021), https://www.dcaf.ch/sites/default/files/publications/documents/NationalCybersecurityStrategiesWB_2021.pdf.
[54] National Cybersecurity Strategies in Western Balkan Economies, Geneva Centre for Security Sector Governance (2021), https://www.dcaf.ch/sites/default/files/publications/documents/NationalCybersecurityStrategiesWB_2021.pdf.

sophisticated cyber threats against critical information structures and other important information systems, understand risks to cyberspace of Montenegro, provide adequate recommendations and improve cooperation with the private and public sectors;

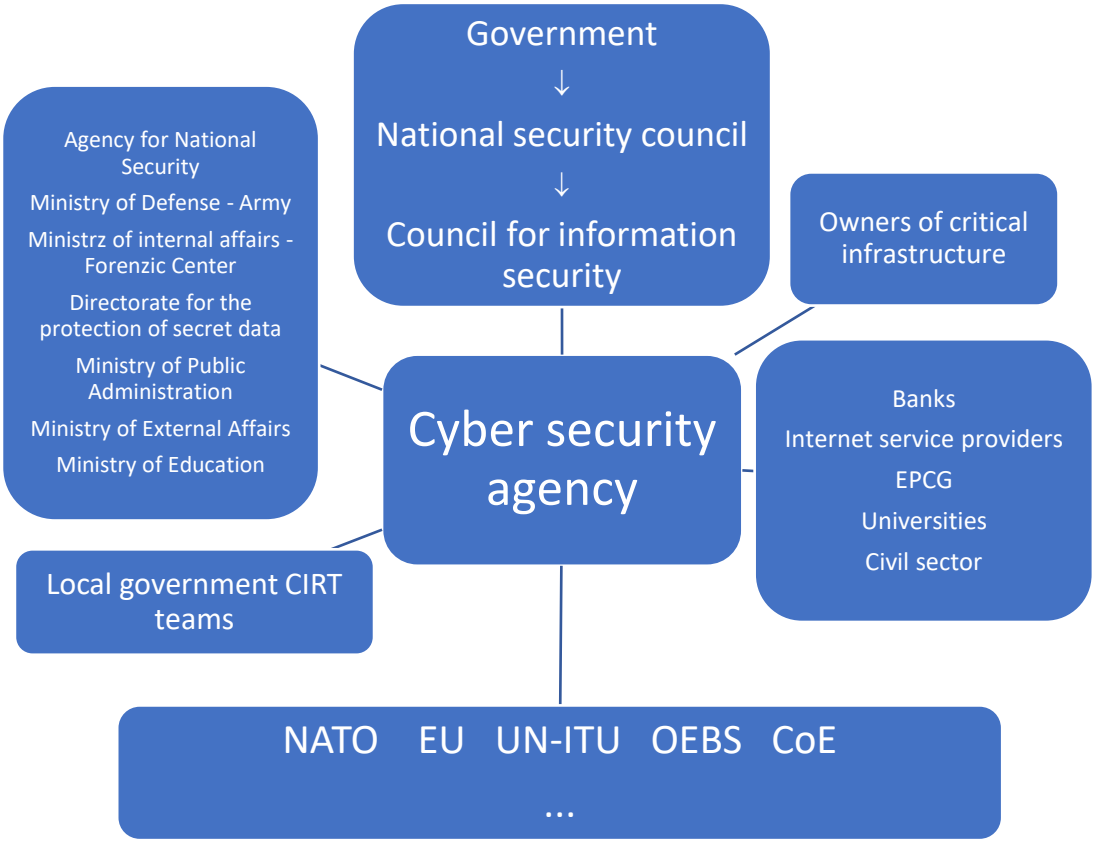
- Continue to strengthen the critical information infrastructure (CII) defence capabilities, and since the National CIRT has a key role in this field, it must have adequate resources and tools to effectively understand, analyse and respond to the wide spectrum of threats in this field;[55]
- The need for strengthening inter-institutional cooperation has been identified, whereby a special accent will be placed on efficient and timely exchange of information and best practices. In this context, the responsible institutions will work on strengthening communication methods through, among other things, organisation of exercises for crisis communication in the case of cyber-incidents and large-scale attacks. The exercises will be aimed at defining clear communication procedures in crisis situations as well as their timely revision;
- Strengthen the national capacities necessary for security accreditation of communication and information systems and the processes where classified information is used, as well as the capacities in the field of crypto protection;
- In order to achieve the best cybersecurity practice, the responsible bodies will learn about the newest cyber threats and undertake activities on educating citizens and organisations about protection mechanisms in cyberspace. Sustainable, continuous and coordinated efforts are necessary to achieve wider changes in behaviour and secure that all target groups, public and private sectors, as well as individual citizens, understand risks and threats in cyberspace;
- Continue with dedicated work aimed at supporting the response to incidents and sharing of information and joint initiatives in partnership with private sector. Therefore, a high level of communication, cooperation and integration is the most efficient way to understand and properly respond to the needs and challenges of private companies with the aim of undertaking the necessary measures and achieving a sufficient degree of security;
- Continue with regional and international activities and exercise its influence by investing in partnerships which shape global evolution of cyberspace in the manner which improves and spreads economic and security interests and strengthens collective security.

Until November 2022, Government CIRT was established and operated within the Ministry of Public Administration, and since December 2022, in accordance with the amendments to the Data Secrecy Act, it switched to the Directorate for the Protection of Secret Data. According to the Strategy which also sets the organisational structure in the field of cybersecurity, the main body responsible for cyber security would be the Agency for the cyber security, within which would operate Government CIRT. The new Law on information security (which is still in the process of adoption) states that the Government's CIRT remains in the Ministry of Public Administration and that the Agency (Article 23, point 9) cooperates with the Ministry – the Government's CIRT, in order to strengthen information security, exchange information about incidents and how to solve them.

[55] For more information on the National Computer Incident Response Team (CIRT), visit the following link: https://www.cirt.me/O_Nama.

Other bodies that are recognised as responsible for the cyber security are: Ministry of Public Administration, National Security Agency, Ministry of Defence, Ministry of Internal Affairs – Forensic Center, Ministry of Justice, Human and Minority Rights, Ministry of Foreign Affairs, Ministry of Education and Directorate for the Protection of Secret Data.

Figure 7. Organizational structure in the field of cyber security[56]



Finally, there are a pair of entities which work closely with the Ministry of Public Administration and the National Security Agency of the Ministry of Defence. These are the National Security Council and Council for Information Security. A breakdown of their responsibilities can be seen below:

Also, within the Ministry of Internal Affairs there is established a High-tech anti-crime group, with the aim of strengthening the capacity of state bodies for law enforcement. This institutional body deals with the issues of the high-tech criminal, such as classic acts of computer crime, child pornography, abuse of payment cards, and abuse of copyright. In addition, a memorandum of understanding was signed between

[56] Cybersecurity Strategy of Montenegro 2022-2026 (2022), https://wapi.gov.me/download-preview/2416dd90-e512-4e51-a050-2556276f31bb?version=1.0 (Montenegrin).

Montenegro and NATO, which should facilitate cooperation and assistance between Montenegro and NATO in the field of cyber security[57].

At the end of September 2023, Ministry of Public Administration prepared the final version of the new Law on information security[58], which prescribes the measures and standards of information security, information systems and data and determines the authorities that will supervise this area. By adopting this law, Montenegro will be the first country in the Western Balkans region to fully harmonize its national legislation in the field of cyber security with the European NIS Directive from December 2022, by which the European Union requires member states to adopt and publish by October 17, 2024 a series of strict rules, measures and regulations concerning the need to strengthen cyber security. In this sense, this law strengthens critical information infrastructure and prescribes an operational framework for managing cases of cyber incidents and crises.

Building Trust and Confidence in the Use of ICTs for Children and Youth

In recent years, the central government in Montenegro has taken numerous steps to protect young people as they navigate the digital space. The country signed the Council of Europe's Convention on the Protection of Children against Sexual Exploitation and Sexual Abuse ("the Lanzarote Convention") in June 2009.[59] Additionally, it is an active participant in the WePROTECT Global Alliance.[60] The multi-stakeholder initiative facilitates cross-sectoral collaboration in order to prevent online child sexual exploitation.

Numerous departments at the national level have mandates that extend to child online protection. The Ministry of Education, for instance, has a mechanism by which parents and educators can report child sexual abuse material (CSAM) found while navigating the virtual space.[61] Additionally, the Ministry of Public Administration is responsible for organizing Safer Internet Day. These two entities, along with the Ministry of Interior Affairs, are the primary organisations coordinating policy action. However, coordination across these agencies is constrained.[62] Encouraging regular cooperation will lead to more positive results.

[57] Digital Agenda Observatory (2022), https://nvo35mm.me/publications/download/29.
[58] For more information, visit the following link: https://www.gov.me/dokumenta/e0bbdb63-8f15-4b79-8833-9390f286d7a1 (Montenegrin).
[59] For more information on the convention, as well as its signatories, visit the following link: https://www.coe.int/en/web/conventions/full-list?module=signatures-by-treaty&treatynum=201.
[60] For a list of governments affiliated with the venture, visit the following link: https://www.weprotect.org/alliance/governments/.
[61] For more information, visit the following link: https://www.cirt.me/cirt (Montenegrin).
[62] Status of national child online protection ecosystems in South Eastern Europe, ITU (2020), https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Publications/FINAL%20REPORT.pdf.

Online violence and security

As stated by the UNICEF[63], the latest Ipsos survey on issue of online media literacy, conducted in November 2022, showed that there has been an increase in the number of parents in Montenegro actively mediating their children's media consumption in the last few years.

From 2018 to 2022, the percentage of parents limiting their children's screen time increased from 30 to 50 per cent, while the percentage of parents limiting the media content that their children can follow doubled from 32 to 64 per cent.

More importantly, while in 2018 only one in five parents stimulated critical analysis of media by talking to their children about the media content that they follow, one in two parents did so last year.

Ministry of Labour and Social Welfare with the support of UNICEF established the National SOS Children's Line 116-111, which children can use not only to report violence, but also to seek psychological support and advice in relation to any issue that bothers them.

Digital education and skills

To build a more resilient, equitable and relevant educational system that responds to the needs of the 21st century, Montenegro engendered important policy and institutional changes. Policy documents such as the Strategy for digitalisation of the education system in Montenegro 2022-2027[64], the Statement of Commitment to Transforming Education (2022),[65] and the National Statement of Commitment for the SDG Summit (September 2023), reinforce the pivotal role of the digital transformation. At the operational level, the Ministry of Education (MoE) with the support of UNICEF established the Digitalna škola (digitalnaskola.edu.me) platform for online teaching, learning, and collaboration, and further improved the Montenegro Education Information System (MEIS)[66] for data monitoring and education planning.

In cooperation with the Bureau for Education, UNICEF has supported the development and delivery of the three 2-day modules covering the topic of improving the quality and inclusiveness of education in the digital environment:

(i) Introduction to teaching and learning in the digital environment covering the importance and basics of digital learning,
(ii) Education in the digital environment- support to teachers and cooperation with students,

[63] For more information, visit the following link: https://www.unicef.org/montenegro/en/stories/media-literacy-every-child.
[64] Strategy for digitalisation of education system in Montenegro 2022-2027 (2022), https://wapi.gov.me/download/39e9ae34-71a5-4dcb-bd41-7d884236584b?version=1.0 (Montenegrin).
[65] Statement of Commitment to Transforming Education, (2022), Montenegro_National Statement of Commitment.pdf (sdg4education2030.org).
[66] For more information, visit the following link: meisportal2.edu.me.

(iii) creating individualized learning methods focused on understanding student diversity and applying technologies to create learner-centered and personalized learning environments.

As many as 20 per cent of teachers received training to use digital tools in teaching in a quality and inclusive manner, reaching almost 50 per cent of all students in primary and secondary schools in Montenegro

In cooperation with the Textbooks Publishing Agency, UNICEF has supported the development of the Quality standards for digital textbooks and auxiliary digital education. The policy document aims to support the process of creating digital textbooks and instructional materials and can serve as a guide for teachers, students, authors, and publishers and it is the first of its kind in the region. Despite these advances, education in Montenegro still faces important shortcomings.

The different researches find out that the children growing up in poverty show lower attendance rates, leave school earlier, and are at higher risk of drop-out. Even if there are planned investments in equipment in schools, their realisation will not result in increased quality, inclusiveness, and digitalisation if they are not integrated with teachers' capacities and adequate digital learning resources in pedagogical practice, and if students are not given agency to create and implement reform solutions. Furthermore, education in the Montenegrin education system does not fully comply with important EU standards and principles, such as the EU's Digital and Green Agenda, thereby hampering the country's accession process. The primary goal of the joint action by UNICEF, UNESCO, and ILO is to introduce - and to scale-up - innovative approaches for schools and teachers, to prepare students for the digitalized 21st century.

Bureau for Education with UNICEF support introduced the *C-board application* [67] as an assistive augmentative tool designed to help children with speech and language impairments, aiding communication with symbols and text-to-speech. The C-board is helping families and teachers become more aware of their children's full potential and it encourages their development. Since the C-board app was launched in 2019, a total of 75 children with speech and language impairments have received this application. Professionals from three Resource Centres and teaching staff from five kindergartens and schools in three municipalities were trained to work with children to use this app.

Sectoral information system interoperability

As per the *RCC Feasibility study for identification of technical interoperability in Montenegro* [68], Montenegro has achieved a certain level of interoperability readiness by adopting relevant legislative acts in the field. However, there are still some steps to be followed when it comes to the implementation of the existing legal framework. Thus, for Montenegro to achieve full digital interoperability of all central government and municipality bodies and their information systems, all administration information systems in Montenegro will need to connect with the Single Information System for Electronic Data

[67] For more information, visit the following link: https://www.unicef.org/montenegro/en/stories/c-board-helps-seid-communicate.
[68] Feasibility study for identification of technical interoperability in Montenegro, Regional Cooperation Council (2022)

Exchange (SISEDE). It is crucial to point out that there have been no technical barriers identified regarding such integration at the time of drafting this report. The results of the conducted analysis clearly demonstrated that Montenegrin authorities have the technical capacity to achieve such integration of SISEDE. However, the allocation of additional resources is necessary as well as strong and continuous political will in order to have effective communication and data exchange between critical information systems in the areas of education, health, social welfare, justice, internal affairs, and tax administration. The cross-sectoral nature of child rights requires effective data exchange between different social sectors in order to achieve optimal policy planning, implementation, and monitoring.

Outside of the public sector, many key stakeholders have taken action to fortify online protections for young users. The non-profit organisation *Save The Children*[69] has led the way in mobilising stakeholders around the issue of child online protection. In short, the work of these groups has been useful for raising awareness of the need for action, though coordination between actors across sectors would increase the likelihood that measures are put into place.

Stakeholder ecosystem: Organisations active in child online protections[70]

Government

- Ministry of Education;
- National Computer Incident Response Team (CIRT);
- Ministry of Interior Affairs;
- Ministry of Public Administration.

Non-governmental organisations

- NGO "Djeca prije svega" (Children Before Everything);[71]
- Alliance "Parents.me";
- Domen;
- Digitalizuj.Me;[72]
- UNICEF Montenegro;[73]
- Prima (NGO).[74]

Industry

[69] For more information, visit the following link: https://www.savethechildren.net/.
[70] Status of national child online protection ecosystems in South Eastern Europe, ITU (2020), https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Publications/FINAL%20REPORT.pdf.
[71] For more information on the organisation, visit the following link: https://www.facebook.com/djecaprijesvega/ (Montenegrin).
[72] For more information on the organization, visit the following link: https://digitalizuj.me/onama/ (Montenegrin).
[73] The organization also sponsored online safety programmes for Montenegrin youth during the COVID-19 pandemic – more information can be found here: https://reliefweb.int/sites/reliefweb.int/files/resources/MNE_Socioeconomic-Response-Plan_2020.pdf.
[74] For more information on the organisation, visit the following link: https://nvoprima.org/ (Montenegrin).

- Internet digital stakeholders (telecommunication companies);
- Microsoft.[75]

Different organisations participate in different initiatives on the topics related to the safe use of internet and online children safety. Thus, Digitalizuj.me published a set of guidebooks for parents and guardians about the safety of children on the Internet and social networks, while the Ministry of Internal Affairs started a project related to the education of elementary and secondary school children about safety on the internet. Ministry of Education, through its portal[76] created for school children and teachers, publishes short courses about online safety with all information on how to report illegal content, cyber incidents, or which body is responsible for solving these problems, among others.

2.1.6 Resilience and Sustainability of digital infrastructure

A key determinant to ensure the resilience and sustainability of telecommunication infrastructure is the installment of a broadband mapping system. The Government of Montenegro developed legislation that defines the regulatory framework for this particular issue. According to the Law on electronic communication, EKIP adopted the Rulebook on the content and method of keeping the register of operators, the register of approved radio frequencies, the register of assigned addresses, and the register of electronic communication infrastructure and related equipment ("Official Gazette of Montenegro" number 27/14).

The Law on Electronic Communications states that EKIP is responsible for this task, with the duty to collect data from operators who make use of e-infrastructure.[77] EKIP developed Geoportal[78], which provides an overview of the existing and planned electronic communication infrastructure and the availability of broadband Internet.

Secondly, the “Rulebook on the type, manner of delivery and disclosure of data on electronic communications infrastructure and associated facilities which may be of interest for the shared use” prescribes content and the type of data needed regarding physical assets that define telecom infrastructure.[79] Finally, the Law on Measures to Reduce the Costs of Deploying High-Speed Electronic

[75] The company installed Microsoft Live Family Safety, a monitoring tool that allowed parents to monitor the online activities of students, onto school computers according to the 2020 ITU report on child online protections.
[76] For more information about the portal, visit the following link: https://www.skolskiportal.edu.me/Pages/Bezbjednostdjecenainternetu.aspx (Montenegrin).
[77] For the full text of this legislation, visit the following link: https://www.gov.me/en/documents/319cfbfa-1bb5-4378-a199-5551f2dd1df4.
[78] For more information about Geoportal, visit the following link: http://geoportal.ekip.me/login/auth (Montenegrin).
[79] For a 2019 presentation from EKIP summarizing these guidelines, visit the following link: https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2019/Mapping%20Warsaw/ALEKSIC%20-%20EKIP%20-%20Montenegro%2028.06.2019.pdf.

Communications Networks [80] identifies cost-effective measures that should improve infrastructural efficiency.[81]

In accordance with the provisions of the Law on Electronic Communication, EKIP additionally adopted the following:

- Rulebook on conditions for planning, construction, maintenance and use of electronic communication networks, electronic communication infrastructure and related equipment[82]
- Rulebook on technical and other conditions for designing, building and using electronic communication networks, electronic communication infrastructure and related equipment in buildings[83]
- Rulebook on the joint use of electronic communication infrastructure and related equipment[84]
- Ordinance on the width of protective zones and the type of radio corridors in which the planning and construction of illegal structures are not allowed[85]
- Rulebook on the method and deadlines for implementing measures to protect the security and integrity of electronic communication networks and services[86]

This regulatory framework has helped EKIP in its attempts to map out communications infrastructure. The system that has emerged from this legislation seeks to provide data on both network status and broadband coverage to key stakeholders. Moreover, it also strives to:[87]

- Increase in the common use of electronic communications infrastructure (ducts, antenna poles, buildings/facilities, low voltage poles and public lighting posts);
- Improve planning documentation;
- Accelerate next generation network (NGN) development;
- Increase investment;
- Increase broadband access availability.

[80] Decree on the Proclamation of the Law on the use of physical infrastructure for setting up large electronic communication networks speed (2021), https://www.ekip.me/media/documents/general/1642404052_Zakon%20o%20koriscenju%20fizicke%20infrastrukture%20za%20postavljanje%20elektronskih%20k....pdf (Montenegrin).

[81] Broadband Mapping Systems in Europe and Regional Harmonization Initiatives, ITU (2021), https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2020/RRF/21-01-15%20Background%20Paper_Broadband%20Mapping%20Systems%20in%20Europe%20and%20Regional%20Harmonization%20Initiatives_final_clean.pdf.

[82] Official Gazette of Montenegro no. 59/15 and 39/16 (Montenegrin).

[83] Official Gazette of Montenegro no 41/15 (Montenegrin).

[84] Official Gazette of Montenegro no 52/14 (Montenegrin).

[85] Official Gazette of Montenegro no 33/14 (Montenegrin).

[86] Official Gazette of Montenegro no 41-15 and 81/16 (Montenegrin).

[87] Broadband Mapping Systems in Europe and Regional Harmonization Initiatives, ITU (2021), https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2020/RRF/21-01-15%20Background%20Paper_Broadband%20Mapping%20Systems%20in%20Europe%20and%20Regional%20Harmonization%20Initiatives_final_clean.pdf.

The data collected by this system is directly managed by EKIP, which in turn requires operators to provide status updates on a quarterly basis. The database is split into two layers, one that is accessible to the public, and another that is restricted to operators, designers, and officials in government. Information found in the system covers:[88]

- Ducts: geographical location, ownership of the ducts (placed cables), their owners and types, manholes (their owners and types), placed equipment, space availability;
- Cable: geographical location, ownership of the cable, their types;
- Poles: geographical location, height and dimensions of the pole (and ownership), placed equipment, placed cable, space availability;
- Buildings/facilities: geographical location, ownership, placed equipment, space availability.

In addition to the mapping of electronic communication infrastructure, this system enables the mapping of broadband Internet access and the mapping of construction plans for electronic communication and other infrastructure. It also contains data on the electronic communication infrastructure, equipment, network and planned roads, available technologies, an overview of the free capacities within the cable pipes, and the calculation of the possibility of passing a cable or pipe of a certain diameter through them. A certain group of users has the option of entering the boundaries of spatial planning documents and based on them, they can export from the new system all the data needed for their further work. One of the future novelties of the system is the selection of one or more cadastral plots and the export of data on the electronic communication infrastructure located in the area of the selected cadastral plot(s).

The georeferenced database of electronic communication infrastructure contains data on telecommunications cable channels, antenna towers, buildings/objects/containers for housing electronic communication equipment, as well as data on high-voltage energy towers and antenna supports. In addition, the georeferenced database of the electronic communication infrastructure also contains the following:

- Data on telecommunication cable sewerage contain information on routes, shafts, cables, extensions, and terminations.
- Data on telecommunication cable sewerage contain information on routes, shafts, cables, extensions, and terminations.
- Data on antenna towers contain information about the characteristics of the tower, antennas, and equipment located on the tower with associated photos and drawings.
- Data on buildings/objects/containers contain information on the size of the same, as well as on the layout of the equipment in the same with associated photos and drawings.
- Data on antenna mounts contain information about antennas and equipment located on the mount with associated photos and drawings.
- Data on external cabinets and electronic communication equipment placed in them are submitted with associated photos and drawings.

[88] For a link to the EKIP site, visit the following link: http://212.69.25.52/login/auth.

- Data on overhead lines contain information on routes, cables, extensions, as well as poles on which overhead lines are hung.

2.1.7 Financing and Investments

Predominant investments in the development of digital infrastructure in Montenegro came from the business sector and were motivated by the development and expansion of companies participating in the electronic communications market. In this sense, the following stand out:

- Crnogorski Telekom (part of Deutsche Telekom Group)
- Mtel (part of Telekom Serbia)
- One Montenegro (part of 4IG PLC)

Electronic communications operators in Montenegro invested over €650 million in the development of digital infrastructure in the previous 10 years. The operators of electronic communications in Montenegro invested slightly more than €68 million in the development of electronic communication networks and services in 2022. Realized investments are higher by 33.54 per cent compared to 2021, when a little more than €51 million of investments were realized. Operators in the electronic communications sector in Montenegro plan to invest around €65 million in 2023, around €44 million in 2024 and around €45 million in 2025.[89]

The private sector would benefit from a framework for financing that nurtures entrepreneurship. Credit lines and factoring facilities are presently available. However, securing funding has been an issue for companies in Montenegro. Interest rates are high among traditional banks and microfinancing institutions.[90]

In order to accelerate the implementation of the *Montenegro Digital Transformation Strategy 2022-2026*, the Government provides financial support through:

- The Ministry of Public Administration provides individual financial support for ICT projects/programs through the competition "ICT for all - digitize yourself".[91]
- Ministry of Science and Technological Development supplies co-financing support among innovation and tech entrepreneurs.

[89] EKIP's Public statement (March, 2023), https://ekip.me/latest-informations/announcement/visok-nivo-investicija-u-sektoru-elektronskih-komunikacija-u-crnoj-gori (Montenegrin).
[90] Digital Innovation Profile – Montenegro, ITU (2020), https://www.itu.int/dms_pub/itu-d/opb/inno/D-INNO-PROFILE.MONTENEGRO-2020-PDF-E.pdf.
[91] For more information about Public competition for financial support for projects/programs - development of digitalization in 2022 - "ICT for all - digitalize yourself", visit the following link: https://www.gov.me/clanak/javni-konkurs-za-finansijsku-podrsku-projektima-programima-razvoj-digitalizacije-u-2022-godini-ict-za-sve-digitalizuj-se.

- Innovation Fund, which was established in 2021 by the Government of Montenegro with the support of UNDP.[92]
- Science Technology Park.[93]

Other central agencies, as well as international groups, have contributed to supporting local entrepreneurs.[94] The Montenegro Investment and Development Fund, for instance, provides favorable loans to start-up groups, though they often require significant collateral.[95] Moreover, the Montenegro Employment Agency also provides assistance to self-employed individuals, although these also require collateral investment. Outside of the public sector, prominent actors like South Central Ventures have become popular sources of venture capital.[96] Even so, businesses in Montenegro still struggle to find reliable and sustainable support to grow their companies in the country.

A 2020 report issued by the ITU detailed the funding challenges faced by the tech industry. Some of the main macro-level barriers to capital funds that prevent growth in the Montenegrin market are:[97]

- Poor access to capital and resources is not encouraging innovation in Montenegro, especially start-ups, and entrepreneurs are looking elsewhere for support;
- For conventional sources of funding, there is a high level of scrutiny on loan applications, and interest rates are high;
- Government funding and some co-financing are available, though limited in volume, impact and synergies;
- Despite the importance of low-level and seed funding, risk capital is difficult to secure – venture capital, equity, and mezzanine and business angels are scarce;
- There are low levels of research and development (R&D) funding available – in relation to both government and small and medium enterprises (SMEs);
- Foreign direct investment efforts need to be more supportive of ICT and digital innovation;
- Non-financial resources are limited in size and scope.

To remedy these issues, the country has several options at its disposal to increase the appeal of markets to investors from abroad.[98] Increasing high-level coordination among government ministries, especially when it comes to digital development projects, could unlock socio-economic growth. Policymakers could also propose legislation that is designed to help start-ups in the country, particularly those that could make waves in the EU region. Finally, more attention should be paid to the process of digital

[92] For more information, visit the following link: https://fondzainovacije.me/o-fondu/.
[93] For more information, visit the following link: https://ictcortex.me/en/clanica/naucno-tehnoloski-park-crne-gore/.
[94] Actors who are involved in this area also include the following: Podgorička Banka, Lovćen Banka, Erste Bank, the Investment and Development Fund of Montenegro, the Public Procurement Administration of Montenegro, the Employment Agency of Montenegro, the Montenegro Business Angels Network, South Central Ventures, Superfounders, hub:raum, and Eleven.
[95] For more information on the Investment and Development Fund, visit the following link: https://www.irfcg.me/en/2014-03-05-12-55-38/2014-03-05-12-56-48.html.
[96] For more information on South Central Ventures, visit the following link: https://sc-ventures.com/investment-strategy/.
[97] Digital Innovation Profile – Montenegro, ITU (2020), https://www.itu.int/dms_pub/itu-d/opb/inno/D-INNO-PROFILE.MONTENEGRO-2020-PDF-E.pdf.
[98] Digital Innovation Profile – Montenegro, ITU (2020), https://www.itu.int/dms_pub/itu-d/opb/inno/D-INNO-PROFILE.MONTENEGRO-2020-PDF-E.pdf.

transformation, as the government is well-positioned to work alongside businesses seeking to leverage the benefits of digitalisation.

2.2 Building Block 2: Adoption

Fully unpacking the use of ICTs by various groups in society allows for a more informed understanding of the digital divide. It also offers insight into which policy interventions could be implemented to secure equitable access. This requires a closer look at the myriad dimensions of digital inclusion, such as i) measures for the affordability of virtual services; ii) interventions created to enhance the skills of individuals; and iii) proposals that extend access to ICT for all in Montenegro.

2.2.1 Affordability

To ensure that access to connectivity is meaningful, there is a need for such connectivity to be affordable as well as inclusive and accessible to all users. Therefore, *access* and *affordability* are the strongest determinants of a third factor of connectivity, *uptake*.

In 2022, the mobile-data basket price was around 0.87 per cent of gross national income (GNI) per capita for an allowance of at least 2 gigabytes (GB). This represents a drop of 1.43 per cent compared to a year before and moves to the average seen at the European level in 2021, which was 0.51%[99]. Additionally, the cost of fixed broadband was approximately 1.7 per cent of GNI per capita in 2022, which also represents a decrease of around 0.3 per cent compared to a year before. Even if it is below the 2 per cent GNI per capita monthly mark set by the Broadband Commission as a threshold for wider availability, it is still above the rate in Europe in 2021 of about 1.3 per cent per capita.[100] This information suggests that improvements are needed in order to make connectivity more affordable. Ultimately, it should be on their agendas as they prepare for the future.

Finally, regarding the matter of *connectivity uptake*, Montenegro succeeds in some areas while faltering in others:

- Fixed broadband subscriptions per 100 inhabitants[101]: Looking at figures produced in 2022, Montenegro has approximately 31 subscriptions per 100 inhabitants, highest among the 9 countries that ITU works with in Europe.[102] Their nearest competitor is Georgia (29), followed by

[99] World Telecommunication/ICT Indicators Database 2023 – Retrieved September 2023, ITU (2023), https://datahub.itu.int/data/?i=12047&e=MNE&c=5.
[100] ICT Price Baskets (IPB), ITU (2021), https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/IPB.aspx.
[101] World Telecommunication/ICT Indicators Database 2023 – Retrieved September 2023, ITU (2023), https://datahub.itu.int/data/?i=12047&e=MNE&c=5.
[102] World Telecommunication/ICT Indicators Database 2023 – Retrieved September 2023, ITU (2023), https://datahub.itu.int/data/?i=12047&e=MNE&c=5.

Bosnia and Hercegovina (27) and Serbia (26).[103] However, although it is moving closer, this number is still lower than the EU-27, which averages 35 subscriptions per 100 inhabitants.

- Active mobile-broadband subscriptions per 100 inhabitants: The country has around 100 subscriptions per 100 inhabitants in 2022, exceeding the 90 subscriptions they reached back in 2021.[104] Yet the country still lags behind its peers in the EU-27, as the data indicates that they have 110 subscriptions per 100 inhabitants in 2022.
- Estimated proportion of households with a computer: There are no available data for Montenegro after 2018. However, according to information collected in 2018, 61 per cent of households had access to these devices.[105] The country is well below the average of 80.5 per cent of households seen in the EU-27 recorded in 2019.[106]
- Households with internet access at home: In 2022, 81% of Montenegrin households had access to internet at home. The data shows that Montenegro is behind Europe's average (88 per cent), but also behind Bosnia and Hercegovina (97 per cent), Georgia (88 per cent), Serbia (83 per cent), Turkey (94 per cent) and Ukraine (83 per cent)[107].

2.2.2 Skills

The lack of skills/competencies in Montenegro is recognized as critical, and accordingly, in the Strategy for digitalisation of the education system in Montenegro 2022-2027[108], this challenge is recognized as one of the main goals in the process of digital transformation.

Over the years, a number of strategies have been put into place to improve the quality of education in Montenegro. Additionally, with the development of ICT, and thus the intention and commitment of the Government of Montenegro to create a digital society and make available digital resources to all, the need for the development and raising of ICT skills are recognised as one of the key preconditions. When it comes to digital skills, in 2020, there was 70 per cent of individuals in Montenegro with basic skills, while

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The Status of Connectivity in 9 Non-EU Countries of Europe Region, ITU (2021), https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2021/Meaningful%20Connectivity/Report%20-%20The%20Status%20of%20Connectivity%20in%209%20non-EU%20countries%20of%20Europe%20region_final_clean.pdf.

[103] The countries that are included in this 2021 study include Albania, Bosnia and Herzegovina, Georgia, Moldova, Montenegro, North Macedonia, Serbia, Turkey, and Ukraine.

[104] World Telecommunication/ICT Indicators Database 2023 – Retrieved September 2023, ITU (2023), https://datahub.itu.int/data/?i=12047&e=MNE&c=5.

[105] The Status of Connectivity in 9 Non-EU Countries of Europe Region, ITU (2021), https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2021/Meaningful%20Connectivity/Report%20-%20The%20Status%20of%20Connectivity%20in%209%20non-EU%20countries%20of%20Europe%20region_final_clean.pdf.

[106] According to 2018 statistics, Montenegro is only higher than Turkey (~57%), Moldova (~55%), and Albania (~20%).

[107] World Telecommunication/ICT Indicators Database 2023 – Retrieved September 2023, ITU (2023), https://datahub.itu.int/data/?i=12047&e=MNE&c=5.

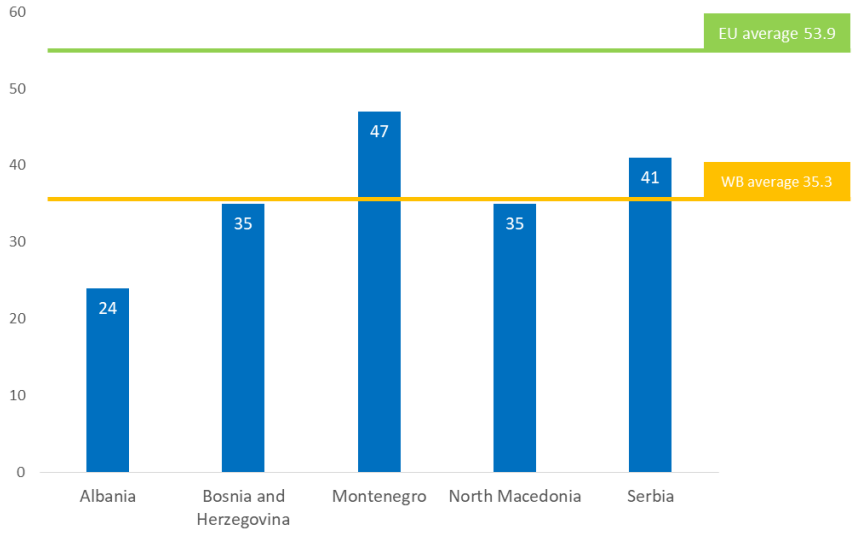
[108] Strategy for digitalisation of education system in Montenegro 2022-2027 (2022), https://wapi.gov.me/download/39e9ae34-71a5-4dcb-bd41-7d884236584b?version=1.0 (Montenegrin).

in 2021 there were 39 per cent of individuals with standard skills and 7 per cent of individuals with advanced skills[109].

The Digital Economy and Society Index (DESI) also covers the Human Capital dimension which measures the digital skills needed to take advantage of the possibilities offered by the digital society. These skills include a wide range of abilities for using digital devices, applications, and information and are perceived as the enablers of internet use, use of digital public services, and advanced digital technologies.

According to the data, in 2021, 85 per cent of people in the Western Balkans used internet in the last 12 months, and only 35 per cent possessed at least basic digital skills. Montenegro has the highest score in the WB region, with 47 per cent of people with at least basic skills, followed by Serbia with 41 per cent. Although Montenegro is above Western Balkan countries' average score, it is still below the EU average (53.9 per cent).

Figure 8. At least basic digital skills (% of individuals), 2021[110]

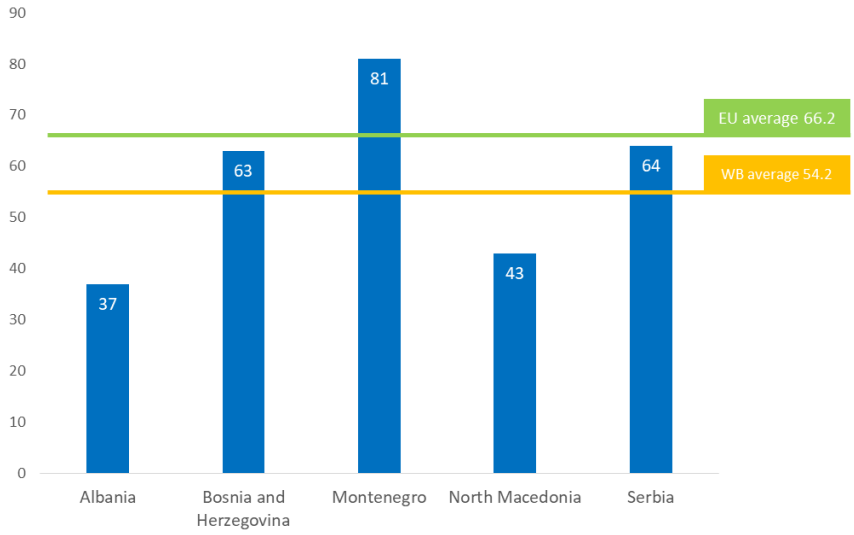


Another indicator is the percentage of individuals with above basic digital skills. In 2021, 9 per cent of individuals in the WB region had above basic digital skills which are well below the EU average of 27 per cent. Montenegro is in the second place, with 9 per cent, achieving the average of the Western Balkan countries, but still behind EU numbers.

Finally, in Montenegro, 81 per cent of people had at least basic digital content creation skills in 2021, followed by Serbia and Bosnia and Herzegovina with 64 per cent and 63 per cent respectively. According to this indicator, Montenegro is above Western Balkan countries, and also above EU countries.

[109] World Telecommunication/ICT Indicators Database 2023 – Retrieved September 2023, ITU (2023), https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx.
[110] Western Balkans Digital Economy Society Index, WB DESI 2022 Report (2022), https://www.rcc.int/pubs/159/western-balkans-digital-economy-society-index-wb-desi-2022-report.

Figure 9. At least basic digital content creation skills (% of individuals), 2021[111]



In 2019, the Ministry of Science presented the Smart Specialization Strategy of Montenegro 2019-2024[112]. This strategy identified ICT as a sector with strong economic potential and transformed it into a strategic priority. However, the strategy also identified as a weakness the fact that education is not adapted to the market, while the outflow of ICT experts and the lack of IT awareness and literacy are recognised as a threat.

Montenegro Digital Transformation Strategy 2022-2026 recognised digital skills in different forms as one of the key obstacles in digital development:

- The lack of digital skills in general and in formal education;
- The lack of educated experts, although there is a significant number of ICT study programs at the University level;
- The lack of digital skills within specific groups (e.g.; Unemployed, public servants, managing structures, older citizens etc.);
- The lack of digital skills for smart and safe use of the internet, information, and overall understanding of eServices and for use of eID among the population;
- The problem of access to digital technologies, both at individual and institutional, and sectoral levels.

[111] Western Balkans Digital Economy Society Index, WB DESI 2022 Report (2022), https://www.rcc.int/pubs/159/western-balkans-digital-economy-society-index-wb-desi-2022-report

[112] Smart Specialization Strategy of Montenegro 2019-2024 (2019), https://wapi.gov.me/download/18205a91-1afc-4eb7-a5cb-8ad5bd0b7712?version=1.0 (Montenegrin).

Beyond general reforms, these policy frameworks have highlighted the need to invest in digital skill-building and digitize the sector of education.[113] This priority is incorporated into many documents, as follows:[114]

- Strategy for digitalisation of education system in Montenegro 2022-2027;
- Early and preschool education strategy in Montenegro 2021-2025;
- Vocational Education Strategy in Montenegro 2020-2024;
- General Secondary Education Strategy 2015-2020;
- Strategy for Inclusive Education in Montenegro 2019-2025;
- Strategy for education of teachers in Montenegro 2017-2024;
- Strategy for development of higher education in Montenegro 2016-2020;
- Strategy for education of adults in Montenegro 2015-2025;
- Strategy of smart specialisation 2019-2024.[115]

While the targets of these strategies differ, they reflect the same goals for reforming the system. Areas of emphasis, which have guided policymaking in Montenegro since 2011, found in each plan, include the following priorities which are central for digital skill-building:[116]

- Provide opportunities for comprehensive individual development, regardless of sex, age, social and cultural background, national and religious affiliations and physical conditions;
- Meet the needs, interests, demands and ambitions of individuals for lifelong learning;
- Enable individuals to take part in work and activities in line with their capacities;
- Facilitate the process of integration into Europe.

Additionally, there are numerous initiatives launched in order to raise awareness and strengthen the development of digital skills in society.

Thus, the Ministry of Public Administration launched Digital Academy, an online platform for educating and connecting all relevant participants who work in the field of building of the digital and leadership skills of public servants, students, and minorities that are of strategic priority. The main goal of the Digital Academy is creating and providing of the short programs for the improvement of competencies and skills for the digital transformation of Montenegro, as well as raising of the digital awareness of Montenegrin society and the digital competitiveness' of the ICT sector.

Also, at the beginning of 2022, the Ministry of Public Administration announced a public tender for financial support for projects/programs that contribute to the development of digitization in 2022 under

[113] Connectivity in education: Status and recent developments in nine non-European Union countries, ITU-UNICEF (2021), https://www.itu.int/dms_pub/itu-d/opb/phcb/D-PHCB-CONN_EDUC-2021-PDF-E.pdf.
[114] There is also a draft strategy on lifelong entrepreneurial learning that also incorporates digital skill-building – more information can be found at the following link: https://www.itu.int/dms_pub/itu-d/opb/phcb/D-PHCB-CONN_EDUC-2021-PDF-E.pdf.
[115] For a full text of this strategic document, prepared by the Ministry of Education and UNICEF, visit the following link: https://www.unicef.org/montenegro/media/7876/file/MNE-media-MNEpublication312.pdf.
[116] World Data on Education – Montenegro, IBE-UNESCO (2011), http://www.ibe.unesco.org/sites/default/files/Montenegro.pdf.

the title "ICT for all - digitize yourself". The aim of public tender was to contribute to the implementation of various activities of the proposed project, non-governmental organizations realize more activities that will contribute to the implementation of training/education and interactive workshops for the elderly in the field of ICT. Six projects in the field of ICT education got financial support, in the total amount (for all) of almost €60,000.

2.2.3 Inclusion

Bridging the Gendered Digital Divide

The Ministry of Public Administration, Digital Society and Media (currently Ministry of Public Administration), with the support of the UNDP office in Montenegro, in 2021 published the "Assessment of the framework of digital governance in Montenegro - Assessment of the gender gap in the field of digital governance, and in the design, development and management of STEM products/services from foreign public administration[117]". As stated in the report, the lack of gender awareness in the process of digital transformation of public administration is evident at the global level, both from the creation of the policy framework to the process of providing and using the e-services themselves.

Additionally, UNDP published "Human development report for Montenegro for 2020 - A digital future within reach for all"[118]. In general, the findings indicate that women in Montenegro manage to overcome the traditional stereotype related to gender differences and that, especially in the category of lower educated, they have surpassed men in their willingness to master and use new technologies.

Leading world practices (for example OECD[119]), provide recommendations for achieving gender equality in the public sector through five main channels:

- inclusion of gender equality in planning, development, implementation and evaluation of relevant public policies and budgets;
- strengthening mechanisms of responsibility and supervision over gender equality and integrating initiatives across and within state bodies;
- encouraging a balanced representation of the sexes in decision-making positions in public life, through encouraging greater participation of women in government at all levels, as well as in parliaments, the judiciary and other public institutions;
- taking appropriate measures to improve gender equality in employment in the public sector;

[117] For more information, visit the following link: https://www.undp.org/sites/g/files/zskgke326/files/migration/me/undp-mne-2022-Procjena-rodnog-jaza-u-oblasti-digitalnog-upravljanja.pdf (Montenegrin).
[118] For mor einformation, visit the following link: https://files.cargocollective.com/c953148/NHDR-2020-CG.pdf (Montenegrin).
[119] For more information, visit the following link: https://www.oecd.org/governance/2015-oecd-recommendation-of-the-council-on-gender-equality-in-public-life-9789264252820-en.htm#:~:text=The%202015%20OECD%20Recommendation%20of,to%20inform%20inclusive%20policy%20decisions.

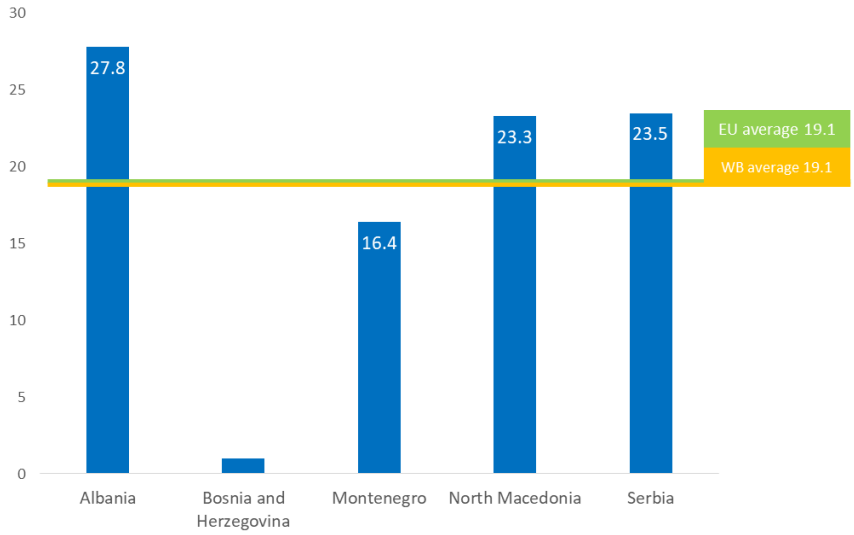
- strengthening of international cooperation through constant exchange of knowledge, lessons learned and good practices on gender equality and inclusion of empowerment initiatives in public institutions.

The key observations of this research state that, in order to achieve greater gender balance and gender quality and in the context of successful digital development, the harmonization of key elements such as:

- availability of data classified by gender,
- appropriate (enacted) legal regulations and
- The institutional framework adequate to support both the development of gender regulation and the collection of gender-disaggregated data, as well as the development, implementation and monitoring of gender e-services.

Additionally, according to the DESI index which also examine the gender balance issue, only 16.4 per cent of ICT specialists are women in Montenegro in 2021. This number is below the WB countries average and EU average (both at 19 per cent) and thus far from gender equality.

Figure 10. Female ICT specialists (% of ICT specialists), 2021[120]



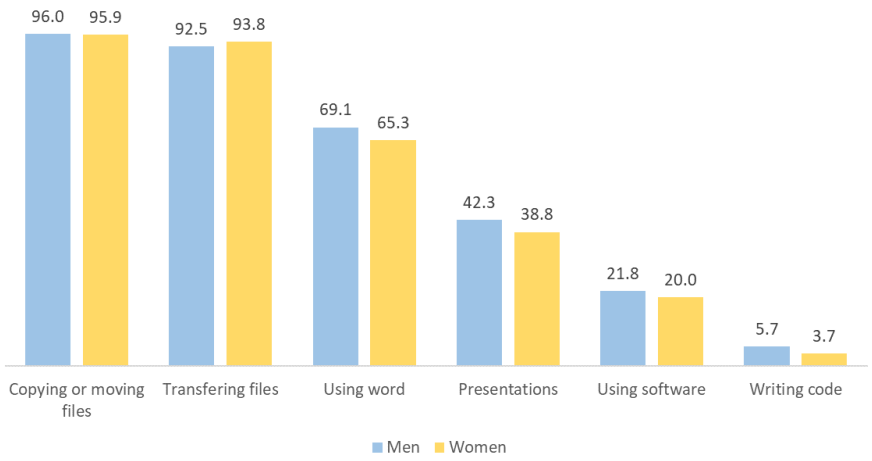
In general, there is a disparity in access to ICTs that affects women in Montenegro. According to a 2021 report drafted by ITU and UN Women, statistics show that men use the internet far more than women, especially when compared to the rates of adoption seen in the wider region.[121] The publication makes

[120] Western Balkans Digital Economy Society Index, WB DESI 2022 Report (2022), https://www.rcc.int/pubs/159/western-balkans-digital-economy-society-index-wb-desi-2022-report

[121] Digitally empowered Generation Equality: Women, girls and ICT in the context of COVID-19 in selected Western Balkan and Eastern Partnership countries, ITU and UN Women (2021), https://www.itu.int/dms_pub/itu-d/opb/phcb/D-PHCB-EQUAL.01-2021-PDF-E.pdf.

note of how gender-specific barriers may be factors in dissuading women from making use of digital technologies.[122]

Figure 11. Gendered Differences in Digital Skills

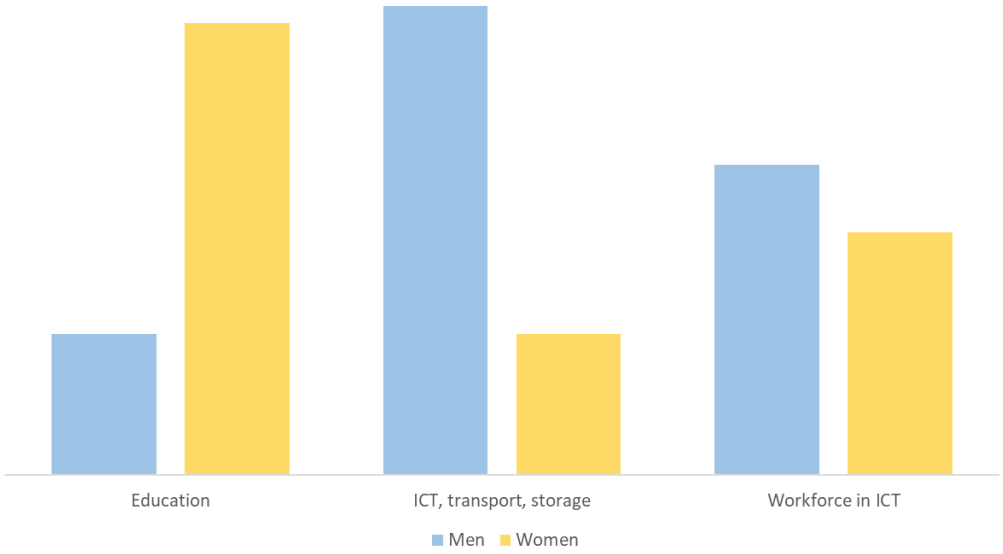


Regarding the field of education, fields of study that focus on technology are predominated by men. Gender parity is lacking in ICT education, as well as vocational education and training (VET) programs.[123] Women are more inclined to specialise in education, business, law, and philosophy. In this regard, priority should be placed on encouraging women to explore ICTs and STEM.

[122] Digitally empowered Generation Equality: Women, girls and ICT in the context of COVID-19 in selected Western Balkan and Eastern Partnership countries, ITU and UN Women (2021), https://www.itu.int/dms_pub/itu-d/opb/phcb/D-PHCB-EQUAL.01-2021-PDF-E.pdf.

[123] Digitally empowered Generation Equality: Women, girls and ICT in the context of COVID-19 in selected Western Balkan and Eastern Partnership countries, ITU and UN Women (2021), https://www.itu.int/dms_pub/itu-d/opb/phcb/D-PHCB-EQUAL.01-2021-PDF-E.pdf.

Figure 12. Representation in Education and the Workforce



There are also long-term challenges to gender representation within institutions of higher learning. Currently, there are five schools that are known for preparing ICT professionals for their future careers. However, men are the majority of enrolees in these institutions. Taking the example of one university, it is estimated that there were only 15 women in a class of 100 students.[124]

Online gender-based violence

From a policymaking standpoint, the Government has implemented numerous measures that would tackle the issue of gender-based cyberviolence. The country has ratified the Council of Europe's Convention on Cybercrime, which seeks to address threats which may impact how users make use of the internet.[125] Moreover, policymakers also crafted safeguards to preserve the confidentiality and integrity of data in the Cybersecurity Strategy of Montenegro 2022-2026[126]. Finally, the Directorate for Protection against Computer and Security Incidents and the Information Security Council have been formed to advise government officials on cyber trends that may adversely affect the Montenegrin public.

It is also worth noting that Montenegro is party to the Istanbul Convention, with the treaty entering into force in August 2014.[127] Even so, lenient abuser penalties and inefficient bureaucratic processes have

[124] Digitally empowered Generation Equality: Women, girls and ICT in the context of COVID-19 in selected Western Balkan and Eastern Partnership countries, ITU and UN Women (2021), https://www.itu.int/dms_pub/itu-d/opb/phcb/D-PHCB-EQUAL.01-2021-PDF-E.pdf.
[125] For more information on this treaty, which is also known as the Budapest Convention, visit the following link: https://www.coe.int/en/web/impact-convention-human-rights/convention-on-cybercrime#/.
[126] Cybersecurity Strategy of Montenegro 2022-2026 (2022), https://wapi.gov.me/download-preview/2416dd90-e512-4e51-a050-2556276f31bb?version=1.0 (Montenegrin).
[127] For more information on the convention, visit the following link: https://www.coe.int/en/web/istanbul-convention/home.

discouraged many women from filing criminal complaints.[128] Additionally, victim support services and public legal aid are not widely available. With these considerations in mind, more resources should be directed toward women who encounter harassment in both online and "offline" spaces.

The Montenegrin government has made the elimination of gender inequity one of their priorities. This commitment is most evident in the National Strategy for Gender Equality 2021-2025 with Action Plan 2021-2022[129] with the main goal *to achieve a higher level of gender equality in Montenegro by 2025.* The document lists out goals to improve the well-being of women, including targets that would impact how women make use of ICTs:

1. *Improving the application of the existing normative framework for the implementation of gender equality policy and protection against discrimination based on sex and gender:*
   - Standardize procedures for the implementation of public policies;
   - Establish a unified and comparable record of cases of discrimination based on sex and gender
   - Educate employees and management staff in institutions about key concepts in the field of gender equality and their obligations in the field of gender equality in accordance with the law
   - Educate the members of the Commission for the implementation, coordination, monitoring and evaluation of the success of gender equality policies, including gender-responsive budgeting
   - Include all three branches of government, non-governmental organizations, employers' organizations, trade unions, citizens and the media in the dialogue on the development of public policies and intensify the public dialogue of all branches of government regarding the prevention of gender discrimination
   - Introduce gender-responsive budgeting into the public finance management system

2. *Improving policies in the field of education, culture and media in order to reduce the level of stereotypes and prejudices towards women and people of different sexual and gender identities*
   - Introduce gender-responsive content and mandatory use of gender-sensitive language in curricula and classes
   - Educate educational staff to encourage the values of civil, gender equal and inclusive society in children and young people
   - Organize media literacy training in order to recognize all types of stereotypes, including gender stereotypes
   - Introduce gender-responsive programs and the mandatory use of gender-sensitive language in the programs of cultural institutions

[128] Digitally empowered Generation Equality: Women, girls and ICT in the context of COVID-19 in selected Western Balkan and Eastern Partnership countries, ITU and UN Women (2021), https://www.itu.int/dms_pub/itu-d/opb/phcb/D-PHCB-EQUAL.01-2021-PDF-E.pdf.

[129] National Strategy for Gender equality 2021-2025 with Action plan 2021-2022 (2021), https://wapi.gov.me/download-preview/77dce535-ea50-438d-8968-25aa4ce62257?version=1.0.

- Encourage the media to introduce gender-responsive programs and to use gender-sensitive language
- Introduce monitoring of media coverage from a gender perspective (gender responsible media monitoring)

3. *Increasing the level of participation of women and persons of different sexual and gender identities in areas that enable access to natural and social resources and benefit from the use of resources*
   - To empower women and persons of different sexual and gender identities to participate in political decision-making
   - To empower women and persons of different sexual and gender identities, as well as marginalized and vulnerable persons and groups to participate in the economy and economic decision-making
   - In executive bodies and public companies, as well as in private companies, raise the level of prevention and protection against gender-based discrimination, sexual harassment and blackmail, as well as gender-based violence and multiple discrimination in the workplace
   - More efficiently protect women and people of different sexual and gender identities from economic violence
   - Encourage a tripartite dialogue on changes to the law that will enable greater participation of women in the labor market and achieve a better balance between business and private life
   - Organize campaigns for a more even distribution of housework, care for children, the elderly, people with disabilities, etc. between men and women and regularly monitor data on the participation of men and women in unpaid care work and household work
   - Empower girls to enroll in undergraduate, master's and doctoral studies in STEM studies (science, technology, engineering, mathematics)
   - Assess the impact and implement prevention measures in order to reduce the negative impact of climate change and natural disasters on the health of women, men, persons of different sexual and gender identities, as well as marginalized and particularly sensitive persons and groups

Montenegro Digital Transformation Strategy 2022-2026, also recognizes that in the process of digital transformation, it is important to regulate the issue of gender equality, i.e., to enable everyone to use public services under equal conditions, but also to create preconditions for planning and adopting public policies with the application of gender equality principles. A survey conducted by Ipsos Strategic Marketing[130] for the office of the United Nations Development Programme in Montenegro (UNDP Montenegro) regarding the attitudes and perceptions of public administration employees and the evaluation of the application of gender equality principle in public government institutions, concluded that there is regulatory framework in Montenegro that regulates the field of gender equality and creates preconditions for the integration of the gender aspect into public policies and capacities of institutions,

[130] For more information, visit the following link: https://www.ipsos.com/en.

but that it is not sufficiently developed and functionally usable[131]. The same report states that the institutional mechanisms themselves are not strong enough and do not have sufficient capacity to adequately implement and monitor policies in this area.

These results are confirmed by the research *Assessment of the need for training of public administration employees*[132] conducted by the Damar agency[133], with the support of the UNDP Montenegro in June 2021. According to this research, 63.8 per cent of public administration employees always apply the principles of gender equality when creating services, as well as strategic acts and other documents. When it comes to e-services, almost 2 out of 3 employees do not collect data on the sex/gender of service users when providing services, which may lead to the conclusion that they do not rely on data when planning important acts, but rather decide on experience and intuition. Based on the foregoing, it is clear that it is necessary to genderize existing and future electronic services, which would be especially important for conducting gender analysis in these areas, but also further gendering of public policies. [134]

ICT and Digital Accessibility for Persons with Disabilities

Montenegro is party to a number of treaties focused on securing the rights of persons with disabilities, including those related to the use of technology. For instance, the country signed the Convention on the Rights of Persons with Disabilities (CRPD) in 2007, with the measure going into effect in 2009.[135]The agreement calls for increasing the participation of individuals with disabilities in society, which may also encompass how these persons interact with the virtual space.[136] Montenegro also joined the Optional Protocol to the CRPD in 2007. It elaborates on many of the stipulations of the Convention while also outlining how individuals can report violations of their rights.[137]

The Government has also taken steps to help citizens who are visually impaired. As an example, it has considered joining the World Intellectual Property Organization's (WIPO's) Marrakesh Treaty, which stipulates the need to ensure copyrighted works, including online resources, can be accessed by persons with disabilities.[138] In January 2020, the government adopted the Information on the Accession of

[131] Gender mainstreaming - Attitudes and perceptions of employees in Public Administration and assessment of the application of the principles of gender equality in public authority institutions (2021), https://rodnamapa.me/assets/documents/stavovi-2021.pdf.
[132] Assessment of the need for training of public administration employees (2021), https://www.undp.org/sites/g/files/zskgke326/files/migration/me/undp-mne-2021-Training-needs-assessment-of-cilil-servants-in-digital-governance.pdf.
[133] For more information, visit the following link: https://damar.co.me/en/home/.
[134] Montenegro Digital Transformation Strategy 2022-2026 with Action Plan 2022-2023 (2022), https://wapi.gov.me/download/59dcab9b-b0e8-48b7-830b-6e4eab690521?version=1.0.
[135] ITU accessibility assessment for the Europe region, ITU (2021), https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2020/AE20/event/D-PHCB-ICT_ACCESS_EUR.01-2021-PDF-E.pdf.
[136] For more information on the convention, visit the following link: https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html.
[137] Optional Protocol to the Convention on the Rights of Persons with Disabilities, OHCHR (2007), https://www.ohchr.org/sites/default/files/Ch-15-a.pdf.
[138] For a list of parties to the agreement, visit the following link: https://wipolex.wipo.int/en/treaties/ShowResults?start_year=ANY&end_year=ANY&search_what=C&code=ALL&treaty_id=843

Montenegro to the Marrakesh Treaty, which pave the way for the ratification of the convention.[139] Two years later, in March 2022, the agreement became law.[140] Looking to the future, this statute will help ensure that resources found via the internet can be used by all citizens.

The government adopted the Strategy for the Protection of Persons with Disabilities from Discrimination and Promotion of Equality 2022-2027[141]. This document first of all emphasizes the effective suppression of all forms of discrimination, and especially emphasizes the need to use digital platforms both in the educational process and for assistance in the daily functioning of persons with disabilities.[142]

Montenegro also adopted the Nation Strategy for Inclusive Education 2019 – 2025, which defines a strategic goal for the inclusion of the persons with disabilities in society. Among other, these goals include the improvement of the services of resource centres for inclusive education, strengthening new functions of integrated departments, modernizing and refining the work of mobile teams, working on improving the accessibility and equipment of schools, continuous improvement of the literature in the field of inclusive education and creating specialized didactic and teaching tools.

Of the individual ICT projects in this field in Montenegro, the Disability Info[143] portal and application are of particular importance, which is part of the results of the project "ICT in the service of realizing and protecting the rights of persons with disabilities" supported by the Telenor Foundation. The portal covers topics for persons with disabilities like education, employment, independent living, accessibility, human rights, health, etc. The main goal is to gather, in one place, information important for people with disabilities, start discussions on different ways to improve the quality of life of these people, and improve the flow of information between them and their organizations. Additionally, with the development of the application, persons with disabilities and their families can get free legal assistance and other information about exercising their rights.[144]

2.3 Building Block 3: Value Creation

One of the most important triggers of the digital transformation at the national level is the government's approach to ICT for governance, administration, and the delivery of public services through digital platforms.

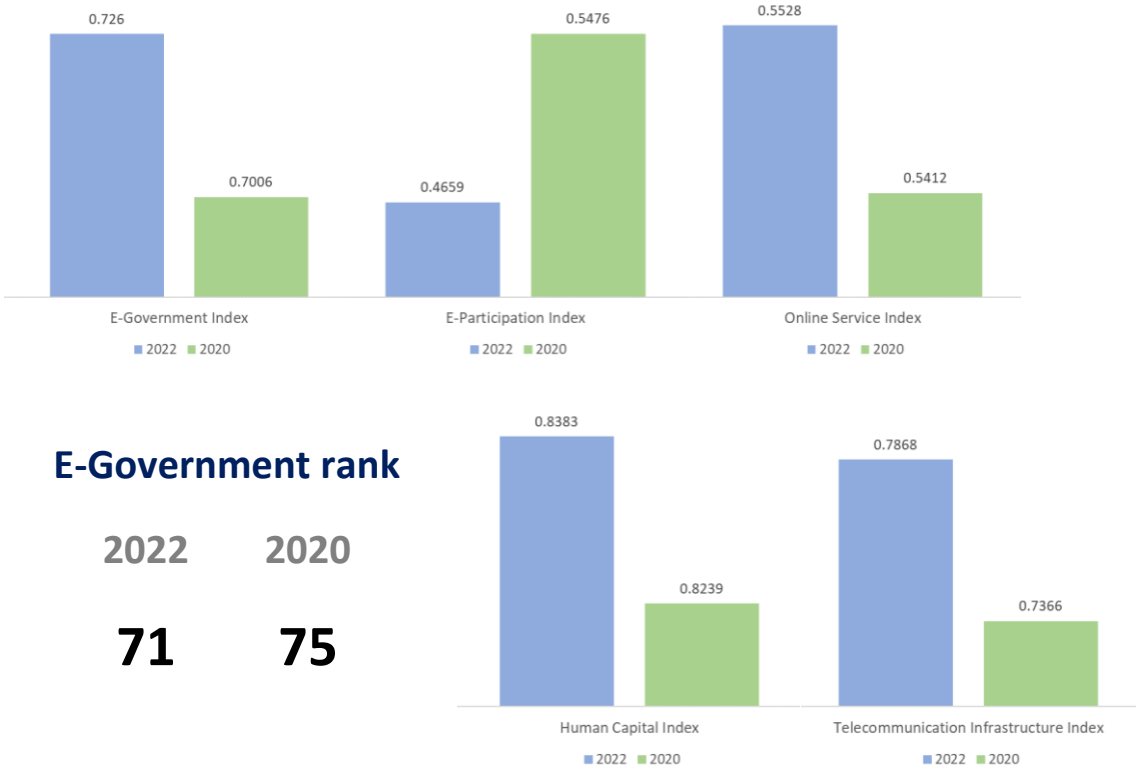
[139] Montenegro and the Marrakesh Treaty, European Blind Union (2022), https://www.euroblind.org/newsletter/2020/january/en/montenegro-and-marrakesh-treaty.
[140] For more information, view WIPO's announcement at the following link: https://www.wipo.int/treaties/en/notifications/marrakesh/treaty_marrakesh_89.html.
[141] Strategy for the Protection of Persons with Disabilities from Discrimination and Promotion of Equality 2022-2027 (2022), https://wapi.gov.me/download/e9659c4e-e7f6-41f2-ab98-0fd115b80601?version=1.0 (Montenegrin).
[142] It represents an upgrade to the previous strategic document for the period 2017-2021.
[143] For more information, visit the following link: https://www.disabilityinfo.me/
[144] For more information, visit the following link: https://disabilityinfo.me/resurni-kutak/itemlist/user/813-disability?start=10.

This section will look at i) the approach to e-government in Montenegro; ii) the administration of digital services; iii) the management of data; iv) policies designed to spur innovation and entrepreneurship; and v) efforts to create an environment that nurtures innovation across sectors.

2.3.1 Whole-of-Government

Montenegro is making progress in the development of e-government. According to the eGovernment index, Montenegro has improved its ranking by four places in two years (from 75th place in 2020 to 71st place in 2022).

Figure 13. E-Government ranking



Regarding the digital transformation of government services, there is one agency who is responsible for coordinating policy changes. The Ministry of Public Administration has a broad mandate that includes

many responsibilities related to digitalisation efforts.[145] A rundown of their obligations is included in the following list:[146]

- Informatisation of the operations of public administration bodies through planning, development and support in the implementation of electronic services;
- Planning, development and support in the implementation of the information and communication portal with citizens;
- Planning activities for the promotion of eGovernment and electronic services;
- Monitoring the development of electronic administration in Montenegro and harmonisation with European standards and best practices in this field;
- Monitoring methodologies and collection of digitalisation and electronic administration development parameters based on established development indexes;
- Coordination of research work on eGovernment development in Montenegro in cooperation with other bodies and institutions;
- Application of accepted standards and methodologies for monitoring the level of use of electronic services and user satisfaction;
- Recognising different user needs and proposing models to increase their satisfaction;
- Preparing the analysis and report on the state of eGovernment and other relevant data in this field and other tasks from the scope of work of the Ministry.

This ministry, as well as its partners throughout the government, have also adopted a roadmap to coordinate their efforts.

This approach is particularly emphasized in the objectives of the Montenegro Digital Transformation Strategy 2022-2026[147] through the following:

Strategic Goal I

- Improving Capacities And Capabilities For Digital Transformation Of Montenegro
- Efficient And Effective Coordination And Monitoring Of Digital Transformation
- Improving Data Availability, Interoperability And Data Management
- Increased Coverage And Modernisation Of Electronic Communication Infrastructure
- Development And Improvement Of Digital Knowledge And Skills Of Montenegrin Society
- Raising The Awareness Of Citizens And The Economy About The Importance Of Digital Development
- Improving The Quality, Quantity And Use Of E-Services

[145] For more information on the Ministry of Public Administration's efforts in this area, visit the following link: https://www.gov.me/en/article/digital-transformation.
[146] Digital Government Factsheet 2019 – Montenegro, Joinup – European Commission (2022), https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_Montenegro_2019.pdf.
[147] Montenegro Digital Transformation Strategy 2022-2026 with Action Plan 2022-2023 (2022), https://wapi.gov.me/download/59dcab9b-b0e8-48b7-830b-6e4eab690521?version=1.0.

  - Improvement And Development Of The Ict Sector
- **Strategic Goal II**
  - Strengthening Digital Awareness Of Montenegrin Society And Digital Competitiveness Of ICT Sector

Finally, a legislation has been passed to pave the way for the digitalisation of the government. The Law on Electronic Government [148] details how administrative bodies should manage the electronic data of Montenegrin citizens. Meanwhile, the Law on Administrative Procedure (2017) provides further guidance on how government bodies should protect personal data when providing public services. Finally, the Law on Electronic Identification and Electronic Signature [149] regulates how digital signatures should be processed by administrative bodies.

Additionally, the United Nations Development Programme in Montenegro (UNDP) implemented the project *"Accelerating Digital Governance[150]"*. The main goals of this project were:

- An Assessment of the digital governance framework prepared and submitted to the Government – legal, institutional, internal IT system and gender gap in digital governance analysis. The Government of Montenegro officially adopted Analysis of legal regulations for the development of e-services and concluded that all public administration institutions should consider recommendations for the improvement of legal and policy acts in order to ensure efficient and accountable public service delivery. Results were presented during the conference Human-centered digital transformation: Public administration at the citizens' service.
- Developed framework for the Catalogue of services and administrative procedures on central and local levels.
- Supported the development of the Digital Transformation Strategy of Montenegro.
- Improved open data management system.
- Improved cooperation of public administration and private sector on the development of inclusive digital solutions.
- Developed women's economic empowerment web platform.
- Assessed the needs of civil servants for boosting knowledge and skills in digital governance.
- Developed online courses for civil servants on digital governance, open data management, gender mainstreaming (RES) and women in STEM.

Additionally, in the process of providing support for the digital transformation in Montenegro, UNDP is intensively working on improving the infrastructure and capacities for digital governance and secure and efficient data management, following EU principles and procedures. The main focus is on the development and improvement of Single Information System for Electronic Data Exchange, which serves to ensure the interoperability of public administration registers and thus enable the smooth development of citizen centred electronic services, shortening of administrative procedures and faster and more

[148] Official Gazette of Montenegro no 72/19 (2019) (Montenegrin).
[149] Official Gazette of Montenegro no 31/17 and 72/19 (2017/2019) (Montenegrin version).
[150] For more information, visit the following link: https://www.undp.org/montenegro/projects/digital-governance-acceleration.

efficient business operations. Furthermore, UNDP is working on the development of the national E-government portal, which will be a single point for providing all electronic services to citizens and businesses in Montenegro. The organisation supports the development of electronic services of the highest level of sophistication both on central and local level and assessing the population needs on e-services continuously since 2018.

UNDP is the main partner of the Government in the projects of development of information systems in the sectors of health, justice and social protection. It is also involved in initiatives in the field of cyber security and open data management, and contributed to the establishment of the first network of ICT public administration practitioners, responsible for managing the digitalization process at the central and local level.

2.3.2 Digital Services

Digital services are fundamental enablers of digital transformation. E-learning, for instance, can expand the horizons of students. Other areas, such as e-agriculture and e-health, can lead to improvements in many aspects of citizens' lives. In this sense, the government is examining Montenegro's circumstances in order to identify how best to employ digital technology to improve the delivery of services to residents. Adopting new policies could hasten the transition to digital.

In 2020, the Law on Electronic Government came into effect. In essence, it serves as the foundation for e-governance within the country.[151] Additionally, it delineates the roles and responsibilities of agencies at all levels of government.[152] Policymakers who crafted the legislation placed emphasis on ensuring that these guidelines for digitalization would reflect international standards. In practice, it is believed that the law was crafted to ensure greater alignment with the practices of EU countries.

There have also been efforts to improve how citizens interact with the government by leveraging technology. A prime example of this policy shift can be seen in the Montenegrin eGovernment Portal, whose development was supported by the UNDP, though implementation of the EU funded projects.[153] The resource provides individuals with information on services including healthcare, education, and finance among others.[154] It also can be accessed by entrepreneurs who are looking for a simpler and more efficient way of fulfilling their obligations to the government. Ultimately, this online system may provide Montenegrin users with a glimpse into the future of public administration.

[151] For the full text, visit the following link: http://www.sluzbenilist.me/pregled-dokumenta-2/?id=%7b5580F3CE-BB54-46F0-9CFC-46ED5D5A7B58%7d (Montenegrin).
[152] 2020 Digital Public Administration Factsheets – Montenegro, European Commission (2020), https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Public_Administration_Factsheets_Montenegro_vFINAL.pdf.
[153] For more information, visit the following link: https://www.euprava.me/en.
[154] 2020 Digital Public Administration Factsheets – Montenegro, European Commission (2020), https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Public_Administration_Factsheets_Montenegro_vFINAL.pdf.

According to the available data published in Montenegro Digital Transformation Strategy 2022-2026, the number of services on the eGovernment portal was 523 in December 2021. These services were provided by 44 institutions, out of which 156 are electronic and 367 are informative (only 10 electronic services could be conducted fully online). Most of the services are developed for business users (321), following those developed for citizens (182) and public administration (20). Research about the level of awareness of e-services by the Montenegrin citizens was conducted by research agency CEED Consulting through the EU funded project implemented by UNDP in cooperation with Ministry of Public Administration, Digital Society and Media of Montenegro (now the Ministry of Public Administration)[155].

At the beginning of 2021, the activities on the project *E-services and digital infrastructure as a response to Covid-19*[156] started. The main goal of this project was to accelerate the digital transformation in public administration in Montenegro, with the development and improvement of platforms that are already in use, as well as the improvement of complex software systems and electronic services.

The establishment of an efficient and sustainable integrated system of simplified electronic services for citizens and the business sector will be achieved through the implementation of a minimum of 10 priority electronic services for these main groups of users which include: Application for issuance of personal card and passport, Submission of application for issuance (renewal) of driver's license, Application for vehicle registration, e-Student, Application for employment in the state administration, Generic e-service for submitting an application for taking professional exams, Electronic service in the field of spatial planning, e-Registration of NGOs, e-Business, Electronic application and deregistration of employees, e-Contributions, Compensation for the birth of a child - connected with e-registration of newborns, e-registration in student dormitories, Application for registration and registration of agricultural holdings and premiums.

During 2022/2023, the following electronic services were developed through the project:

- *Online enrollment at the University of Montenegro* – achieving high efficiency since its development, with over 85 per cent of students enrolling via this online tool in 2022 and 86.5 per cent in 2023;
- *Online enrollment to private kindergartens* – through the e-service, 84 per cent of all children were enrolled online in 2022 and 82 per cent in 2023;
- *Online enrollment for student dormitories* – in 2022 over 86 per cent of students have applied for the accommodation in the dormitories (this percentage has been even higher for first-year students as over 93 per cent of them have used this service);
- *Safe Go CG app* – the e-services serves as proof that a person has been vaccinated against COVID-19, has recently received a negative COVID-19 test, or is protected against the disease after being

[155] For more information, visit the following link: https://www.undp.org/sites/g/files/zskgke326/files/migration/me/undp-mne-2022-Digitalizacija-javne-uprave---istrazivanje-sa-gradjanima.pdf (Montenegrin).

[156] E-services and digital infrastructure as COVID-19 response measure; Projekat finansira EU, a realizuje UNDP u saradnji sa Ministarstvom javne uprave, digitalnog društva i medija; Projektne aktivnosti su počele u januaru 2021. godine i trajaće do januara 2023. godine.

infected. This has provided a common approach to mobility during the pandemic, as well as generated efficient, interoperable systems, and supported the economy, especially tourism and international travel;

- *Online enrollment to private universities Mediteran and Adriatik and web services for University of Donja Gorica* are in the final phase of development;
- *Digital signing of the contracts between students and the University of Montenegro* - in cooperation with Ministry of Education and MPA, for the academic year 2023/24, students could use the newly developed service for digital signing of the contracts on studying with the University of Montenegro. This e-service is one of the first fully digital services as the students would be able to identify themselves and digitally sign the documents by using an eID card;
- *Online application for student scholarships and loans*

Services related to the field of education are realized through the exchange of data through the A unique system for electronic data exchange (JSERP) system[157]. An increase in the use of e-services among citizens was recorded, meaning that 84 per cent of students applied for enrolment electronically and 87 per cent of students applied for accommodation in a student dormitory electronically for the year 2022. Each service implies an address to the Ministry of Internal Affairs and to social services, which means that through JSERP, there were 19,772 web services requested to the Ministry of Internal Affairs and 16,418 web services to the social services.

Also, in order to create a transparent e-government that is available to all, e-participation is crucial. Thus, within the e-government portal, e-participation system are developed, which secures the proactive participation of citizens in social processes and processes of making decisions that are of high importance for their lives and also for the society at whole.

The final report of the Strategy for information society 2016-2020 states that the number of posts at the eParticipation portal has increased in the last years, with 297 public calls published at the end of 2021, compared to 207 published in 2020, and 62 in 2015. It can be concluded that the citizens awareness about the possibilities of e-participation increased.

An additional good example of raising transparency and participation is the portal "Voice of citizens – e-Petitions". This service enables the impact of society in the process of policy creation, by submitting electronic petitions to the Government of Montenegro. The project represents a step forward in the process of improvement of participative democracy, government openness, and active participation of society in the process of creating public policies.

Besides creating favourable conditions for citizen participation, an inevitable part of e-participation is cooperation with the business sector. For these purposes, the service eFirma was established, which represents the system for submitting electronic applications for registration in the Central Register of

[157] For more information, visit the following link: https://www.gov.me/clanak/jedinstveni-sistem-za-elektronsku-razmjenu-podataka-jserp (Montenegrin).

Business Entities (CRPS), as well as submission of requests for the issuance of documentation from the register. This service is part of the integral information system of the Tax Administration of Montenegro and is connected to the system of the Central Registry.

The voluntary international initiative "Open Government Partnership (OGP)", which was launched in 2011, and which Montenegro joined in 2012, shows the importance that the Government of Montenegro attaches to promoting the transparency of public administration, strengthening civil society and the role of citizens in the creation of public policies, as well as the use of new technologies in management.

ICT in education

As mentioned earlier in this report, there are strategies in place that emphasize the need for digital skill-building in the classroom. These strategies include different measures to facilitate the rollout of e-learning throughout the country.[158] Across the board, and at various levels of the schooling system, it is clear that the role of technology in schooling will only increase with time.

At the end of 2021, the Government adopted the Strategy for Digitization of the Education System 2022-2027[159]. This strategy recognizes the importance of digitization of the education system with the aim of encouraging greater use of ICT in teaching to improve the quality of the teaching process, as well as encouraging the development of digital competencies of students and teachers. The strategy defines strategic and operational goals as follows:

- Strategic objective 1: Improvement of the Education Information System
    - Improvement of legal regulation
    - Improvement of hardware infrastructure
    - Development and improvement of software components
    - Improving the processing, use, accuracy and reliability of data
    - Establishment of interoperability and development of electronic services
    - Improvement of the personnel structure
- Strategic objective 2: Development and improvement of the digital ecosystem
    - Establishing a system for planning and development
    - Improvement of legal regulations
    - Improvement of computer infrastructure in educational institutions
    - Development of digital educational content
    - Establishing a platform for independent learning
    - Improvement of online collaboration in all educational institutions
- Strategic objective 3: Development and improvement of digital skills and competencies
    - Raising the level of digital skills and competencies of employees in educational institutions

[158] Montenegro Country Brief – Connectivity in Education: Status and Recent Development in 9 non-EU countries, ITU, UNICEF (2021), https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2021/ITU-UNICEF%20Connectivity%20in%20education/summary%20report%20per%20country/Montenegro%202%20Pager_final.pdf.
[159] Strategy for Digitization of te Education System 2022-2027 (2022), https://wapi.gov.me/download/39e9ae34-71a5-4dcb-bd41-7d884236584b?version=1.0 (Montenegrin).

- Raising the level of digital skills and competencies of students
- Improving the safe use of technology
- Improvement of digital skills and competencies and application of digital technologies through promotional campaigns

The education information system (MEIS) contains a centralized database for all educational institutions and organizers of adult education, as well as a web application through which data is collected into a single database. This information system is connected to the Unified Information System for Electronic Data Exchange (GSB - Government Service Bus), so electronic data exchange is performed according to predefined standards and in accordance with the legal regulations in this area.

The development of MEIS created the prerequisites for the creation of a series of electronic services for citizens and institutions, which will be significantly improved in the coming period, as well as creating new services. The electronic services created as part of the Education Information System are:

- Application for parents (web and mobile)
- Enrolment of children in preschool institutions
- Enrolment of children in primary schools
- Enrolment of children in secondary schools
- Enrolment of children in primary music schools
- Enrolment in institutions of higher education
- School statistics
- School network

The electronic services that have been developed and are available are:

- **Microsoft 365 - The** Ministry of Education, in cooperation with the UNICEF Office in Montenegro, created the document "Digital School" which represents the concept and framework by which schools can, with the help of the Microsoft 365 (Office 365) program package, implement all school activities through adequate digital surroundings.
- **Portal for teachers** - http://www.skolskiportal.edu.me - The portal aims to improve the use of ICT and bring the IT world and its possibilities closer to teaching staff and other subjects in education, which would raise the level of IT knowledge.
- **Portal Podaci.edu.me** - One of the services intended for employees of Ministry of Education, Ministry of Science and Technological Development, Ministry of Culture, Institute for Education, The Institute for Textbooks and Teaching Tools, Center for Vocational Education, and Examination center of Montenegro is the Data Exchange Portal. The goal is to enable the communication between institutions to be regular and purposeful, which ensures the possibility of intensifying cooperation and improving activities between the Ministry of Education and institutions in the field of education.

- **School network** - The website www.skolskamreza.edu.me provides basic information about educational institutions in Montenegro by education level (name of the institution, address, telephone and fax number, e-mail address, location of the institution, etc.). In addition, there is information on the number of institutions by municipality.
- **Portal for parents** – The Ministry of Education, with the support of Crnogorski Telekom, on the initiative of NGO "Classroom in motion", created a new portal Dnevnik (www.dnevnik.edu.me) which enables parents to monitor their child's grades, absences and behavior. The portal also enables parents to communicate with the teacher/head of the department and offers information about scheduled parent meetings, as well as other notifications. In addition to the web application, mobile applications for Android and iOS have also been created.
- **UčiDoma portal** - Teaching materials recorded during the Covid-19 pandemic are available on the website www.ucidoma.edu.me. The contents are classified by education level, class, and subject/module. Also, contents related to the preparation of students for external knowledge verification, matriculation, and professional exams are available. In cooperation with the British Council, content on the development of critical thinking, problem-solving and the use of micro:bit was recorded and published. Content from the field of security is also published on the portal.
- **School Statistics** – The Ministry of Education, with the support of the UNICEF Office in Montenegro, created the School Statistics portal (https://skolskastatistika.edu.me/) where you can find statistical data from the field of education presented in graphic form.
- **Electronic enrolment of children** - On the portal www.upisi.edu.me, during the year 2020, three applications were set up through which a request can be submitted for enrolling children in preschool, primary, and secondary school. Enrolment requests can be submitted for children who are enrolling in that level of education for the first time. From 2021, applications are also available for submitting applications for enrolling students in elementary music schools, as well as for enrolling students in the first year of undergraduate studies at the University of Montenegro. Filling in the form begins with the entry of a unique identity number, and other data is taken from the relevant registers.

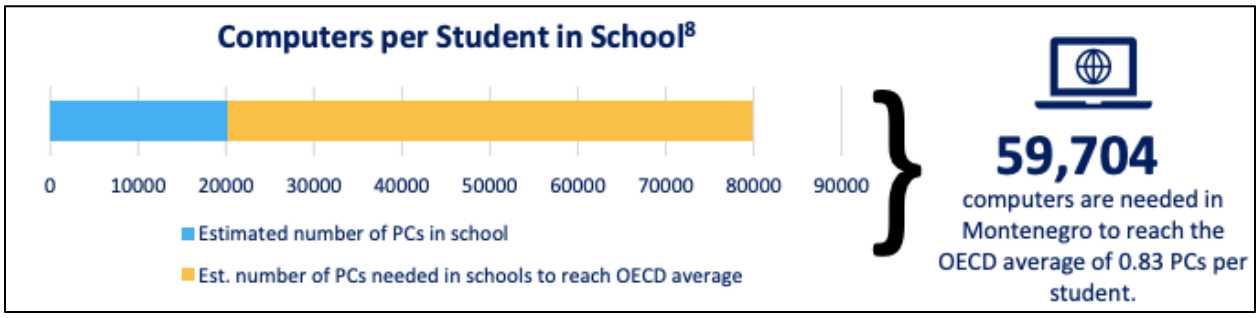
In addition to the aforementioned services, digital content has also been developed. The Institute for Textbooks and Teaching Tools worked on the following multimedia textbook content: the Informatics textbook for the 6th grade of elementary school; "I read, write, research, create with Figo" kit for preschoolers; DAISY textbooks; individual chapters from Montenegrin language and literature and Mathematics for the 1st grade of primary school; interactive educational application (online dichotomous key for determining plants) and "Mathematics through play" for the 3rd grade of elementary school.

As part of the "**Digital Classroom**" pilot project, digital content was created for the 1st grade of primary school, which is available on the website www.uci.me. The publishing house Klett was hired to produce the material, and the company Mtel financed it. This pilot project was implemented in elementary schools during the 2020/2021 school year.

The COVID pandemic also prompted international organisations, such as UNICEF, to make digital education more widely accessible. Early into the crisis, UNICEF convened a meeting of stakeholders

including the Ministry of Education to discuss how to help students make the most of their experience with e-learning.[160] A second assessment was conducted with schools throughout the country with the aim to understand how the pandemic tested the resilience of these institutions. Finally, throughout the crisis, UNICEF and its partners held trainings to help teachers adjust to this "new normal," as it is estimated that nearly 4,500 teachers participated in these workshops.[161].

Figure 14. School Computer Estimates Compared to Recent OECD Averages[162]



A study launched by OECD indicated that there may be only 1 computer for every 4 Montenegrin students.[163] Yet the Montenegro's Information Society Development Strategy 2016-2020 painted a bleaker picture. Their statistics indicated that there was one computer for every 16 students in primary schools and 1 computer for every 14 students at the secondary level.[164] This disparity is most noticeable in rural areas and among minority communities.[165] The cost for filling these gaps and reach the OECD average of 0.83 PC per student could range between USD 4.39 million[166] and USD 50.7 million[167] without counting maintenance cost and staff upskilling; with the low-range estimate being only for the cheapest-available devices - not necessarily ideal for education, and the high-range estimate which is calculated using a higher-end computer and monitor.

[160] For more information, visit the following link: https://www.unicef.org/eca/media/12581/file.
[161] Connectivity in education: Status and recent developments in nine non-European Union countries, ITU-UNICEF (2021), https://www.itu.int/dms_pub/itu-d/opb/phcb/D-PHCB-CONN_EDUC-2021-PDF-E.pdf.
[162] Montenegro Country Brief – Connectivity in Education, ITU (2021), https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2021/ITU-UNICEF%20Connectivity%20in%20education/summary%20report%20per%20country/Montenegro%202%20Pager_final.pdf.
[163] A framework to guide an education response to the COVID-19 Pandemic of 2020, OECD (2020), https://www.hm.ee/sites/default/files/framework_guide_v1_002_harward.pdf.
[164] Strategy for the Information Society Development 2020, Ministry for Information Society and Telecommunications of Montenegro (2016), https://wapi.gov.me/download-preview/68736414-503b-41bb-81b0-753b581fb386?version=1.0.
[165] Connectivity in education: Status and recent developments in nine non-European Union countries, ITU-UNICEF (2021), https://www.itu.int/dms_pub/itu-d/opb/phcb/D-PHCB-CONN_EDUC-2021-PDF-E.pdf.
[166] This estimate is calculated using the cheapest smartphone available in the region, at $73.60 per device. Price estimate is taken from A4AI price data, averaging the cost of the cheapest smartphones available in Georgia, Turkey and Ukraine. Although Smartphones are used as a proxy for the cheapest way to access online educational content and represent a baseline cost, they are not ideal for sustained learning nor comparable to PCs for educational purposes.
[167] This estimate is calculated using a price of $850 per computer and monitor, which is a UNICEF price estimation of a high-end computer and monitor more suitable for learning. It thus represents the most expensive end of the spectrum.

Expanding the availability of technologies for learning, targeting schools that are overlooked and under-resourced, should be prioritised by policymakers moving forward.

The pandemic of 2020 highlighted the state of e-learning and ICT in education in Montenegro, as well as the challenges which affected its rollout across the country. At the beginning of the crisis, the Ministry of Education, Science, Culture and Sports broadcasted lessons via television and the internet.[168] However, macro-level issues undermined this emergency intervention. Many homes did not have reliable access to the internet, while some students lacked the resources needed to participate in these programs. The government took some steps to support families, such as allowing the parents of children with disabilities to receive paid leave in order to help their children with school duties.[169] Even so, youth of all backgrounds and abilities saw their learning disrupted.

The United Nations in Montenegro, as well as its various entities, have launched numerous projects to support childhood learning. A list of such initiatives can be seen below:[170]

- Distribution of paper-based learning materials for Roma and Egyptian children who do not have access to distance learning channels;
- Distribution of tablets to Roma children, children with disabilities, children in foster care and others unable to access online learning owing to a lack of devices;
- Extending the partnership with Special Olympics Montenegro to enable children with intellectual disabilities and families to implement the Young Athletes early childhood education programme at home through the distribution of equipment and development of video tutorials;[171]
- Enhancing and consolidating systems for registering online enrolment and supporting the development, in cooperation with the Ministry of Education, Science, Culture and Sport, modules for monitoring school-based support during COVID-19, mapping needs and establishing guidance for further development of the digital education system;
- Capacity-building for teachers to use digital tools in a high-quality and effective manner in everyday teaching, along with capacity-building, in cooperation with the Ministry of Education, Science, Culture and Sports, for pre-school teachers to support learning for Roma children;
- Developing a platform for online learning and collaboration, in cooperation with UNICEF Headquarters, the University of Cambridge and Microsoft;[172]
- Establishing and equipping an IT laboratory at the Centre for Children in Conflict with the Law to enable children residing at the institution to acquire digital skills and facilitate distance learning;

[168] Connectivity in education: Status and recent developments in nine non-European Union countries, ITU-UNICEF (2021), https://www.itu.int/dms_pub/itu-d/opb/phcb/D-PHCB-CONN_EDUC-2021-PDF-E.pdf.
[169] The COVID-19 Crisis in Montenegro, OECD (2021), https://www.oecd.org/south-east-europe/COVID-19-Crisis-in-Montenegro.pdf.
[170] The UN Socio-economic response plan to COVID-19 in Montenegro, United Nations Montenegro (2020), https://reliefweb.int/sites/reliefweb.int/files/resources/MNE_Socioeconomic-Response-Plan_2020.pdf.
[171] #YoungAthletesAtHome and #PlayAtHome for children with disabilities, UNICEF Montenegro (2020), https://www.unicef.org/montenegro/en/stories/youngathletesathome-and-playathome-children-disabilities.
[172] Digital School launched – a platform for learning, teaching and cooperation, UNICEF Montenegro (2020), https://www.unicef.org/montenegro/en/stories/digital-school-launched-platform-learning-teaching-and-cooperation.

- Supporting children and adolescents with learning difficulties through the Study Buddy peer-learning programme led by the UNICEF Youth Innovation Lab, in partnership with associations of young people with disabilities and;[173]
- A partnership between the Ministry of Education, Science, Culture and Sports, the Ministry of Public Administration and UNDP, culminating in the creation of a new electronic enrolment system for safe and timely enrolment in primary school and kindergarten for the coming school year.[174]

Digital Agriculture

Interventions crafted by policymakers focused on agriculture emphasize the importance of technology in transforming the sector. The Strategy for the Development of Agriculture and Rural Areas 2023-2028[175], for example, recognised some important areas for improvement like modernization of agriculture and rural areas by encouraging and sharing knowledge, innovation and digitization in agriculture and rural areas and promoting their use among farmers through better access to research, innovation, knowledge sharing and training.[176] Moreover, Priority Reform Measure No. 2 of the Montenegro Economic Reform Programme 2022-2024 outlines Support for investments in the sector of manufacturing agricultural and fish products with the aim of reaching EU standards. This component supports the procurement of manufacturing equipment, the introduction of new technologies and innovation, and the creation of new market opportunities. [177]

Finally, the Smart Specialization Strategy 2019-2024 examines how ICT integration would be a central factor in supporting sustainable agricultural practices.[178]

Several projects have been launched in recent years to integrate digital technologies into the agriculture sector. One example is MIDAS 2, a World Bank-funded venture that began in 2018 and builds off the MIDAS (Montenegro Institutional Development and Agriculture Strengthening) initiative.[179] This project is designed to improve the productivity of the sector as a means of supporting Montenegro's EU pre-accession process. To accomplish this goal, reforms will be implemented to introduce a payment agency,

[173] For more information on projects led by the UNICEF Youth Innovation Lab in Montenegro, visit the following link: https://open.unicef.org/country-output?output-id=8950A004002003000.
[174] Supporting education system to cope with COVID-19, United Nations Montenegro (2021), https://montenegro.un.org/en/46007-supporting-education-system-cope-covid-19.
[175] Strategy for the Development of Agriculture and Rural Areas 2023-2028 (2023), https://wapi.gov.me/download/1e9c16c3-8814-49ab-ba89-de4f60f796af?version=1.0 (Montenegrin).
[176] For the full text of this strategic document, visit the following link: https://wapi.gov.me/download/1e9c16c3-8814-49ab-ba89-de4f60f796af?version=1.0.
[177] Montenegro Economic Reform Programme 2022-2024 (2022), https://www.gov.me/en/documents/7049c66a-5b87-4102-9d2e-6fde9c24fd5d.
[178] For the full text of this strategic document, visit the following link: https://wapi.gov.me/download-preview/ea1d661e-922a-4d42-af8d-ae55bc53988e?version=1.0.
[179] For more information on the MIDAS projects, visit the following link: https://projects.worldbank.org/en/projects-operations/project-detail/P107473.

farm registry, and pilot grant scheme to facilitate future sectoral investment.[180] It also seeks to introduce a series of forward-looking agri-environmental measures.

In addition, the Food and Agriculture Organization of the United Nations (FAO) supported the establishment of the Farm Accountancy Data Network (FADN). The system collects farm level data according to EU standards and, thus, helps better manage farm data, as well as provides policy makers information on farm productivity, the effects of public support and for setting future policies.

The third project, the Digitization of Municipal Land Management Project, which is also being implemented in Montenegro in 2020, with the support of Telegroup and German Development Cooperation and the Ministry of Agriculture and Rural Development of Montenegro, aims to establish or improve land management with the support of a digital software solution (AgroLIFE).

Another notable initiative promoting agricultural innovation is the BIO-ICT Centre of Excellence. Housed within the University of Montenegro, this research organisation focuses on the development and implementation of novel bioinformatic technologies.[181] Its work has been used to create products for digital soil mapping, sea water monitoring, and smart irrigation management.[182] Those in the field believe that the projects affiliated with the BIO-ICT Centre of Excellence will transform the sector. To these experts, the venture may give rise to an innovation ecosystem that strengthens Montenegrin's business.

Finally, the Centre of Excellence for Digitization in the Field of Food Safety and Food Authenticity ("FoodHub") is a project based at the University of Donja Gorica that identifies science-based solutions for the purpose of food safety risk elimination.[183] Its mandate also includes proactive hazard identification, digitalized risk assessment systems, and modern certification programmes. At its core, the center seeks to help those in the food production and local tourism sectors enhance their day-to-day efforts. The project receives support from the Ministry of Science and Technological Development.

Digital Health

Improving efficiencies within the system for healthcare has been a goal for the Government, leading to the creation of the Strategy for Development of Integrated Health Information System and eHealth 2018-2023. Beyond increasing the effectiveness of hospitals throughout the country, this document also

[180] Status of Digital Agriculture in 18 countries of Europe and Central Asia, ITU and FAO (2020), https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Publications/Status%20of%20Agriculture%20in%20Europe%20and%20Central%20Asia%20%287%29.pdf.
[181] For more information on this research programme, visit the following link: http://www.bio-ict.ac.me/About.php.
[182] Status of Digital Agriculture in 18 countries of Europe and Central Asia, ITU and FAO (2020), https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Publications/Status%20of%20Agriculture%20in%20Europe%20and%20Central%20Asia%20%287%29.pdf.
[183] For more information on FoodHub, visit the following link: https://foodhub.udg.edu.me/en/about-us.

identified the ways that healthcare professionals could make better use of ICT solutions.[184] Emphasis is placed on improving information sharing among facilities in all localities. This strategy not only aim to bring digital health services to international standards but also better the welfare of citizens throughout Montenegro through the use of technologies.

In late 2021, the World Health Organization (WHO) announced the creation of the WHO/Europe Western Balkans Digital Health Network.[185] The regional venture was created as a space where elected officials could come together to coordinate digital policy. A list of its goals can be seen below:

1. Support the implementation of digital health priorities identified by the WHO Western Balkans Roadmap for Health 2021-2025;[186]
2. Find ways to accelerate the digitalization of national health systems and the development of equitable digital health services in the Western Balkans (focusing on the delivery of primary health care);
3. Promote the sharing of knowledge and identification of best practices; and
4. Increase subregional collaboration and alignment of actions for digital health.

The strategy for the development of the information society of Montenegro 2016-2020 defined activities for the development of e-health in Montenegro. The strategy also defined the application of the Integrated Health Information System (IHIS), in accordance with previous strategic documents in this area and future plans for the development of the health system. Implementing the activities included in the previous strategy, in 2018 the Strategy for the development of an integrated health information system 2018-2023 was adopted with goals aimed at establishing an efficient and stable health information system management system[187]. The obligation to keep records of medical data in paper and digital form, as well as medical documentation, is prescribed by the Laws in Montenegro.

In this sense, e-services for citizens in the field of health and health care provided by the Health Insurance Fund[188] have been developed. The services are available on the eZdravlje portal (www.ezdravlje.me) and include the following:

- eApoteka - an electronic service intended for citizens (patients), developed with the aim of providing information on the availability of medicines in all pharmacies that have a contract with the Health Insurance Fund.
- eNalaz - an electronic service that enables patients to view the results of biochemical laboratory analyzes via the Internet.

[184] Digital Government Factsheet 2019 – Montenegro, Joinup – European Commission (2022), https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_Montenegro_2019.pdf.
[185] For more information on this announcement, visit the following link: https://www.who.int/europe/news/item/13-10-2021-who-europe-launches-western-balkans-digital-health-network.
[186] To read the report, visit the following link: https://apps.who.int/iris/bitstream/handle/10665/345932/WHO-EURO-2021-3435-43194-60508-eng.pdf?sequence=1&isAllowed=y.
[187] Final report on the implementation of the Information Society Development Strategy 2016–2020 (2021), https://wapi.gov.me/download/8d416f35-814a-4ffc-b5c0-0b2365ca8346?version=1.0 (Montenegrin).
[188] For more information, visit the following link: https://fzocg.me/cyr/.

- eOrdering - an electronic service intended for the insured persons of the Fund, who are registered with selected doctors in health centers. This service enables electronic ordering services:
    - electronic prescriptions (therapy) for chronic patients,
    - reports for the calculation of salary compensation (remittances) during temporary incapacity for work (sickness) and exclusively for sick leave approved by the Fund's first-level medical commissions,
    - certificates issued by selected doctors (currently 2 types of certificates issued by selected doctors for children: Justification for absence from kindergarten and Proof of ability to teach physical education), about sick leave (extension of open sick leave), according to the temporary measures and decisions of the competent authority to combat the spread of the COVID-19 infection (it is currently deactivated).
- eOsiguranje (eInsurance) - an electronic service that enables citizens (insureds) to view the status of their health insurance.
- eRecept (ePrescription) - an electronic service that enables patients to view prescribed and realized prescriptions using advanced technologies and devices (PC, SmartPhone, Tablet devices, etc.).
- eZakazivanje (eScheduling) - service for online scheduling of visits with selected doctors in health centers (selected doctor for adults, selected doctor for women and selected doctor for children).
- Public health institutions - a service that provides a list with contact information of all public health institutions in the health system of Montenegro.
- Medical commissions - a service that enables the review of medical commissions by cities in Montenegro.
- Medicines - a service that displays a list of prescription medicines and medicines used in healthcare institutions.
- Private health care institutions - a service that provides a list with contact information of private health care institutions with which the Fund has concluded an Agreement on the provision of services.

The eZdravlje portal provided 9 services in 2021, which was an increase of 5 services compared to 2020 (Digital agenda observatory, 2020, UNDP).

In the period between February and May 2020, a high increase in the use of electronic services was recorded on the eZdravlje portal, which coincide with the COVD-19 pandemic period and the blockade caused by it, after which, for almost all electronic services, there was a drop in usage nearly to the same level as before the pandemic.

Excluding the period of the COVID-19 pandemic, the analysis shows that citizens the eZakazivanje service is the most used by far. The least used service by citizens is eOsiguranje (eInsurance).

UNDP Montenegro is also implementing project in cooperation with Ministry of Health to achieve following results:

- Result 1: Technical assessment of the functioning of the Integral Health Information System;

- Result 2: Preparation of the strategic and regulatory framework for the efficient functioning of the Integral Health Information System and e-health;
- Result 3: Development of information systems in healthcare:
    - System for marking and monitoring medicines and medical devices - Track and Trace system
    - Electronic health record – HER
    - Platform mHealth
    - Telemedicine platform
    - Ministry of Health Software

In addition, realizing the importance of ICT change in the field of Health, a new Healthcare Development Strategy 2023-2027[189] is in the process of adoption. The strategy was prepared through an inclusive multi-stage process, including technical support from the Regional Office for Europe of the WHO. The draft strategy was published at the end of August 2023.

Circularity of materials: E-waste management

The country saw the Basel Convention enter into force in June 2006.[190] Moreover, it also ratified the Stockholm Convention in March 2011.[191] Lastly, Montenegro joined the Rotterdam Convention in March 2012.[192] Adopting these statutes sends a clear signal that the country strives to minimize the harm caused by electronic waste (e-waste).

Policies are also in place to deal with this problem. The most notable document is the National Waste Management Plan (NWMP) 2015-2020. Many of its objectives are relevant to how the government manages flows of e-waste:[193]

- Strengthening the administrative capacity of institutions and bodies in charge of planning, permitting, control and monitoring;
- Implementing the legislation and the measures resulting from the objectives;
- Introducing mandatory registration of the types and quantities of waste collected by public utility companies (PUCs), authorised private waste collection companies, and companies generating waste, and reporting this information to municipalities;
- Designing and constructing facilities and waste management systems;
- Expanding the waste collection system to cover the entire territory of Montenegro;

[189] Healthcare Development Strategy 2023-2027 (2023), https://wapi.gov.me/download/7d555e10-3616-48c2-a42f-7d3442181450?version=1.0.
[190] For a list of countries party to the Basel Convention, visit the following link: http://www.basel.int/?tabid=4499#ME11.
[191] For a list of countries party to the Stockholm Convention, visit the following link: http://www.pops.int/Countries/StatusofRatifications/PartiesandSignatoires/tabid/4500/Default.aspx.
[192] For a list of countries party to the Rotterdam Convention, visit the following link: http://www.pic.int/Countries/Statusofratification/PartiesandSignatories/tabid/1072/language/en-US/Default.aspx.
[193] Municipal waste management in Western Balkan countries – Country profile: Montenegro, European Environment Agency (2021), https://www.eea.europa.eu/themes/waste/waste-management/municipal-waste-management-country/montenegro-municipal-waste-factsheet-2021/.

- Raising public awareness of the importance of proper waste management and public involvement in the decision-making process.

ITU, UNEP, and UNITAR are assisting the country in tackling this challenge with the "E-Waste Monitoring for the Western Balkans" project. The initiative aims to train officials on how to make and collect e-waste statistics, as well as assess the state of e-waste statistics, e-waste management practices, and the e-waste legislative landscape throughout the 5 Western Balkan countries. The project will conclude in June 2023 with an E-Waste Monitor Report.[194]

There is also a regulation that deals with the definition and arrangement of waste management, with a few notes concerning the management of electronic waste, such as:

- Waste Management Law[195]
- Regulation on the manner and procedure of establishing a system for taking over, collecting and processing waste from electrical and electronic products and the operation of that system.

In addition, a public debate is ongoing regarding the prepared draft of the state waste management plan for Montenegro for the period from 2023 - 2028 with the Strategic Environmental Impact Assessment Report for the state waste management plan for the period from 2023 - 2028[196].

2.3.3 Digital Content and Data

Laws have been implemented to bolster the security of data in the country. Legislation covers a variety of topics, from user privacy to accountability mechanisms. However, there are four key policies which provide general insight into how officials address issues related to data protection:

- Law on Information Security[197] (Provides clarity on the application of information security measures as well as relevant protection standards);

[194] Outcome Report – Digital transformation based on ICT innovations for the development of the digital economy, ITU (2022), https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2021/ITU-Ukraine%20Digital%20Transformation/Outcome%20report%20-%20Digital%20transformation%20based%20on%20ICT%20innovations%20for%20the%20development%20of%20the%20digital%20economy%20-%2015%20Dec%2021/Outcome%20Report_%20Digital%20transformation%20based%20on%20ICT%20innovations%20for%20the%20development%20of%20the%20digital%20economy_14.01.2022.pdf.

[195] Official Gazete of Montenegro no 064/11, 039/16 (2016), https://wapi.gov.me/download-preview/a7f63e12-2180-4947-bdc4-beb0fbc17822?version=1.0 (Montenegrin).

[196] For more information, visit the following link: https://www.gov.me/clanak/javni-poziv-za-ucesce-u-javnoj-raspravi-o-nacrtu-drzavnog-plana-upravljanja-otpadom-za-crnu-goru-za-period-od-2023-2028-i-izvjestaju-strateske-procjene-uticaja-na-zivotnu-sredinu-za-drzavni (Montenegrin).

[197] Official Gazette Montenegro, No. 014/10, No. 040/16 (Montenegrin).

- Law on Protection of Personal Data[198] (Highlights the human rights obligations that should be acknowledged when crafting data protection policy);
- Law on Free Access to Information[199] (Regulates publication of data in an open format);
- Regulation on Measures of Information Security[200] (Describes necessary security features that provide basic data protection which can be adopted by relevant government organisations).

There is one department of the government whose mandate focuses on safeguarding the data of citizens, being the Agency for Personal Data Protections. Its responsibilities include the following:

- Supervise the implementation of personal data protection in accordance with the Law on Personal Data Protection (i.e. "the Law");
- Resolve the requirements of protection of rights;
- Give opinions on the application of this Law;
- Approve the establishment of personal data collections;
- Given an opinion in case of suspicion whether a particular set of personal data is considered a collection in the sense of this Law;
- Monitor the implementation of organisational and technical measures for the protection of personal data and suggest improving these measures;
- Provide suggestions and recommendations for improving the protection of personal data;
- Given an opinion on whether a particular way of processing personal data violates the rights and freedoms of a person;
- Cooperate with the competent state authorities in the process of drafting regulations related to the protection of personal data;
- Propose to assess the constitutionality of laws, or the constitutionality and legality of other regulations and general acts regulating the issues of processing personal data; and
- Perform other activities in accordance with this Law.

2.3.4 Innovation and Entrepreneurship

The entrepreneurial ecosystem in Montenegro, particularly in the tech sector, holds tremendous promise. However, there are a slew of challenges that have prevented the field from reaching its potential. Minimal government incentives, limited funding streams, and restrictive regulatory policies have all hindered local

[198] Official Gazette Montenegro, No. 079/08, No. 070/09, No. 044/12, No. 022/18. To see an earlier version of this law, specifically No. 79/08 and No. 070/09, visit the following link: https://www.azlp.me/docs/zajednicka/zakoni/personaldataprotectionlaweng.pdf.
[199] Official Gazette Montenegro, No. 44/12 i 30/17 (Montenegrin).
[200] Official Gazette Montenegro, No. 058/10, No. 055/15 (Montenegrin).

market growth.[201] Lack of ownership over the innovation agenda in the public sector has exacerbated these long-term issues.[202]

Yet, many entrepreneurs have continued to produce digital solutions that would increase the efficiency of industries central to the Montenegrin economy. These include tourism, real estate, smart cities, environment and green energy, health and well-being, learning and education, business and commerce, e-government and citizen engagement.[203] On balance, self-started business persons still view Montenegro as an "emerging market," increasing the potential for economic expansion in the country.

According to the ITU 2020 *Digital Innovation Profile – Montenegro*, the main challenges hampering the growth of the innovation ecosystem are as follows:[204]

1. There is a lack of skills necessary to exploit digital technology, compounded by a failure on the part of public and private sectors to recognise digital technology as an opportunity for growth;
2. The ecosystem is at an under-developed, initial stage, and role models are absent;
3. Public sector purchasing power is not harnessed to drive 'home-grown' innovative solutions;
4. Poor access to capital is chasing start-up innovation out of Montenegro, impeding scale-ups and digital transformation for SMEs;
5. Regulation lacks consistency, dynamism, and flexibility, which creates a barrier for entrepreneurs and investors;
6. Preconditions for the digital economy, such as digital identity, digital signatures, e-government, and e-payment, remain immature.

These challenges should prompt the Government to take actions and capitalize on the numerous opportunities identified below:[205]

1. The mobilisation of all stakeholder groups in all stages of the ecosystem can generate a platform of success stories to model further success;
2. New policies such as public procurement of innovative solutions and public-private partnerships can be exploited to co-create the preconditions for a digital economy, and to expand soft infrastructure across the country;
3. Tourism offers an opportunity to develop innovative, technology-driven business models;

[201] Digital Innovation Profile – Montenegro, ITU (2020), https://www.itu.int/dms_pub/itu-d/opb/inno/D-INNO-PROFILE.MONTENEGRO-2020-PDF-E.pdf.
[202] Digital Innovation Profile – Montenegro, ITU (2020), https://www.itu.int/dms_pub/itu-d/opb/inno/D-INNO-PROFILE.MONTENEGRO-2020-PDF-E.pdf.
[203] Digital Innovation Profile – Montenegro, ITU (2020), https://www.itu.int/dms_pub/itu-d/opb/inno/D-INNO-PROFILE.MONTENEGRO-2020-PDF-E.pdf.
[204] Digital Innovation Profile – Montenegro, ITU (2020), https://www.itu.int/dms_pub/itu-d/opb/inno/D-INNO-PROFILE.MONTENEGRO-2020-PDF-E.pdf.
[205] Digital Innovation Profile – Montenegro, ITU (2020), https://www.itu.int/dms_pub/itu-d/opb/inno/D-INNO-PROFILE.MONTENEGRO-2020-PDF-E.pdf.

4. Using the limited size of the market to become a 'test-bed' for tech solutions would bring benefits from technology and knowledge transfer;
5. Improving regional cooperation and trade facilitation policies will significantly expand the market for innovation;
6. Support available from the European Union designed to accelerate Montenegro's convergence on policies, benchmarks, monitoring mechanisms, programmes and financial resources related to R&D and digital innovation will significantly improve prospects.

At present, the government has implemented a number of measures to spark innovation in Montenegro. Though progress has been made towards addressing the problems listed above, the lack of coordination among agencies has created a situation in which the environment for regulation is fragmented.[206]

In the middle of 2020, two important laws were passed for the development of the IT sector in Montenegro, namely, the previously mentioned Law on Innovation Activities, and the Law on Incentive Measures for the Development of Research and Innovation[207]. Both laws contain certain forms of measures to strengthen the innovation system, in order to contribute to the economic and sustainable development of Montenegro.

Also, the establishment of the Innovation Fund 2021 created additional institutional support for entrepreneurial and start-up projects in the field of digital development and transformation.

Finally, the association of ICT companies in Montenegro, ICT Cortex, also founded in 2021, recognizes as one of its priority goals that "*Montenegrin economy expansion has to be based on solid innovation development, accumulated knowledge and strong human resources in priority areas."* As stated, through their activities the cluster wants to benefit from the experts in the field, local and international professionals, as well as the usage of the most advanced tools and technologies. Their goal is to directly impact the development and improvement of the IT ecosystem in Montenegro, by building up innovation and competitiveness.[208]

2.3.5 Ecosystem Building

Montenegro has found moderate success in creating a business climate that encourages market innovation, though various indicators show that work remains before the country can become a regional hub of economic activity. Looking at the 2022 edition of the World Intellectual Property Organization's (WIPO's) *Global Innovation Index*, the country is in 60th place out of 132 countries.[209] Their highest score was 44th in "Infrastructure," a category that considers factors like the ease of getting credit and the degree

[206] Digital Innovation Profile – Montenegro, ITU (2020), https://www.itu.int/dms_pub/itu-d/opb/inno/D-INNO-PROFILE.MONTENEGRO-2020-PDF-E.pdf.
[207] Official Gazette of Montenegro No. 082/20
[208] For more information, visit the following link: https://ictcortex.me/en/our-goals/.
[209] Global Innovation Index 2022, WIPO (2022), https://www.globalinnovationindex.org/Home.

of industry diversification.[210] However, their lowest score was 72nd place in "Knowledge and technology outputs," a grouping of metrics that includes ICT service exports and high-tech manufacturing.[211] These results may lead policymakers to reevaluate their agenda for supporting the work of entrepreneurs.

There are a variety of indices that capture how Montenegro is fairing in the global marketplace. For instance, the country was 61st out of 176 countries surveyed in the final ITU *ICT Development Index* (IDI), a report that drew on a variety of metrics to chart the digitization of countries over time.[212] Montenegro placed 73rd out of 141 in the 2019 edition of *The Global Competitiveness Index*, a report issued by the World Economic Forum (WEF) that assesses how states are performing in various industries.[213] Finally, it was 60th out of the 137 countries included in the Global Entrepreneurship and Development Institute's (GEDI's) 2018 *Global Entrepreneurship Index*, a compilation of metrics that examines enablers of business across the world.[214] Results from these measures show the work that remains for Montenegro to provide the necessary foundations to foster an innovation ecosystem.

As mentioned earlier, with the aim to strengthen and develop the basics for the development of the digital ecosystem, the ICT Cortex cluster was established.

The main goals behind the ICT Cortex cluster are:

- Creating an independent and inclusive association
- Education and employment
- Internationalisation and strengthening of the export potential,
- Strengthening innovation and competitiveness
- Digital transformation of society
- Corporate Social Responsibility

With a primary focus on education, internationalization, and digital transformation, the ICT Cortex has analysed the business performance of the Montenegrin ICT sector.

According to their research, about the business performance of Montenegrin ICT sector, conducted with the consulting company CEED Consulting[215], in 2022, the ICT sector generated revenue of over €602 million, which is an increase of 23 per cent compared to the previous year. The majority of the revenue comes from the telecommunications sector, followed by IT services and products, and trade of IT equipment. Net earnings have also significantly increased over the past four years, with a growth rate of 102 percent compared to 2019.

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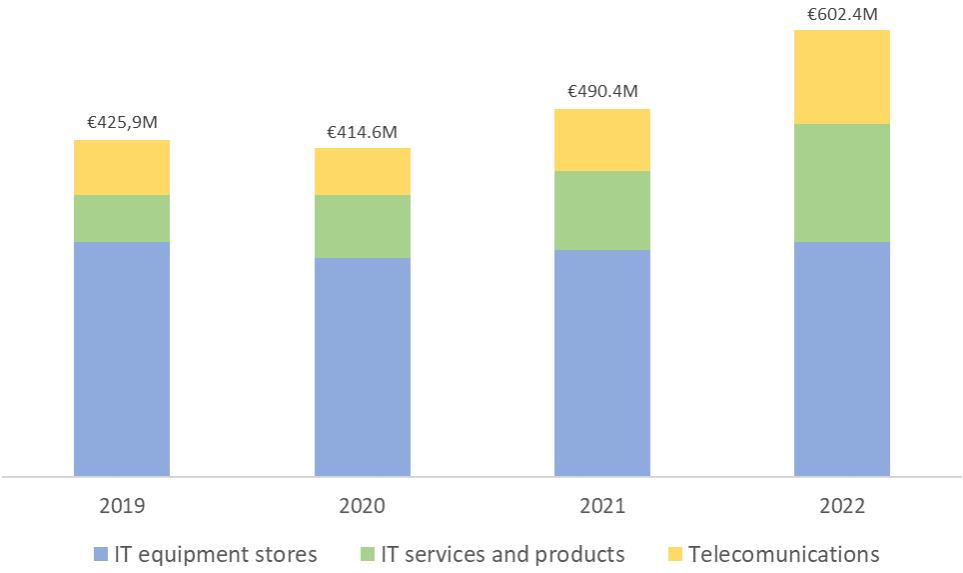
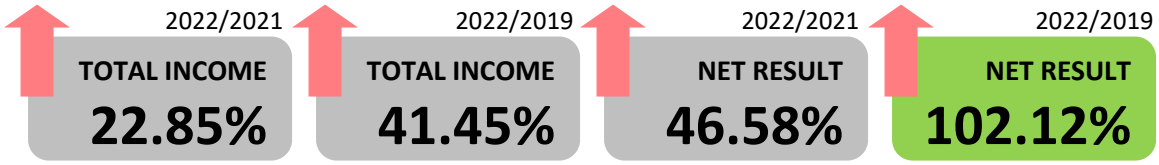
[210] Global Innovation Index 2022, WIPO (2022), https://www.globalinnovationindex.org/Home.
[211] Global Innovation Index 2022, WIPO (2022), https://www.globalinnovationindex.org/Home.
[212] Measuring the Information Society Report – Volume 1, ITU (2017), https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2017/MISR2017_Volume1.pdf.
[213] The Global Competitiveness Report 2019, WEF (2019), https://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf.
[214] Global Entrepreneurship Index, GEDI (2018), https://thegedi.org/global-entrepreneurship-and-development-index/.
[215] Analysis of the Montenegrin ICT sector in 2022 (2022), http://help-montenegro.org/wp-content/uploads/2023/07/Montenegrin_IT_sector_Analysis.pdf

Figure 15. Summary comparison of the ICT industry - total revenue[216]





The ICT analysis and research shows that the ICT sector is one of the fastest-growing sectors in Montenegro. This is evident from the significant increase in the number of companies operating in this field, their substantial financial revenues, and the increasing interest of people in our community in this sector, as reflected in the significant rise in the number of employees.

Research conducted by the Central Bank of Montenegro and MONSTAT also confirms the export potential of the Montenegrin ICT sector. According to their findings, the export activities of computer services have seen a growing share in the country's total exports, increasing from seven percent to as high as 21 percent in the past four years.

The numbers show that the ICT industry, especially the area focused on information technology, has made significant progress in the past four years. With such results, Montenegro has become an important country for investments in the field of information technology and an attractive destination for digital nomads (in December 2021, the Government adopted the Program for attracting digital nomads in Montenegro until 2025[217]). For these reasons, the ICT sector undoubtedly deserves special attention from governmental institutions and the non-governmental sector.

[216] Analysis of the Montenegrin ICT sector in 2022 (2022), http://help-montenegro.org/wp-content/uploads/2023/07/Montenegrin_IT_sector_Analysis.pdf

[217] Program for attracting digital nomads in Montenegro until 2025 (2021), https://wapi.gov.me/download/1149ea60-b9c8-4cba-93c1-86aadbb92c00?version=1.0 (Montenegrin).

Additionally, the Government of Montenegro in 2021 established The Innovation Fund of Montenegro. The Innovation Fund is the umbrella state institution in the implementation of innovation policy measures and programs intended for micro, small and medium-sized enterprises, as well as the transfer of technologies from scientific and research institutions. In 2022, the Fund approved 7 collaborative grants for innovative projects in the total amount of €628,760[218].

3. Conclusions

This document provides a framework to unravel digital development that includes the three building blocks of digital transformation. It provides information about Montenegro for each domain, based on the experiences and activities of the ITU and other stakeholders operating in the country and wider region. This report will serve as a reference for discussions on digital development at the country level as well as stocktaking of relevant activities, initiatives and projects and experiences developed by UN agencies involved in digital transformation work in Montenegro. It aims to provide the baseline study for strategic decisions on initiatives to be undertaken within the UN Sustainable Development Cooperation Framework (UNSDCF), on digital and ICT development matters, to support digital for development. It will serve as a guide for future dialogue with country stakeholders and pave the way for increasingly fit-for-purpose engagements of the UN system in the country.

[218] For more information, visit the following link: https://fondzainovacije.me/wp-content/uploads/2023/05/Izvjestaj-o-radu-Fonda-i-finansijski-izvjestaj-za-2022.-god.pdf.