

ANALYSIS OF THE MONTENEGRIN ICT SECTOR IN 2022.



The research agency CEED Consulting, with the support of HELP Montenegro organization, conducted an Analysis of the Montenegrin IT sector for the needs of ICT Cortexa. The aim of the analysis was to provide a deeper understanding of the current state of the IT sector in Montenegro, its contribution to the GDP, key barriers to its faster development, and the potential of IT as a promising sector for the country's economy.

The content of this analysis is the sole responsibility of the authors and does not reflect the views of ICT Cortexa or HELP Montenegro organization.

All rights reserved. Short excerpts from this publication may be reproduced unchanged without the author's permission, provided that the source is acknowledged.

Table of Contents

Table of Contents	3
List of Tables	4
List of Graphics	4
Abbreviation List	5
INTRODUCTION	6
The aim of the analysis and the methodology	11
Definition of ICT and IT sector	11
The structure of the Montenegrin economy and macroeconomic indicators	14
The role and trends of ICT sector development	18
Development of IT sector	19
Graph 8. Annual Growth Rates of Revenue in the ICT and IT Sectors, 2019-2022	21
Public Procurements for Digital Services	21
Legal, Strategic, and Institutional Framework for the Development of the IT Sector in Montenegro	24
General overview of the legal aspect of IT sector development in Montenegro	24
Strategic Framework for the Development of the IT Sector in Montenegro	28
Institutional framework for the development of the IT sector in Montenegro	32
Chances and Limitations for the Development of the Montenegrin IT Sector	38
Chances for the Development of the Montenegrin IT Sector	39
Limitations for the development of Montenegrin IT sector	41
The results of the research among IT companies	49
Profile of IT companies	50
Business results	53
Review of the business environment	57
Innovation activities	60
Expectations for the next 3 years	63
Preferred support measures	65
Analysis of financial results of ICT companies	66
IT Services and Products	67
Telecommunications	69
Trade of Computer Equipment	71
Information and Communication Technologies in the Past Ten Years	73
Rapid growth, export potential, and investment opportunities	74
Conclusion	75
Bibliography	77

List of Tables

- Table 1. Montenegro - Key Macroeconomic Indicators, 2018-2021
- Table 2. Value of Public Procurements for IT Services, 2021-2022
- Table 3. Company Activities, in % (n=70)
- Table 4. Key Revenue-Generating Activity of the Company, in % (n=70)
- Table 5. Additional Activities of Companies, in % (n=70)
- Table 6. Satisfaction Level with Individual Elements of IT Sector Development Ecosystem in Montenegro, on a Scale of 1 to 10, in % (n=70)
- Table 7. Key Factors Limiting the Growth and Development of IT Sector in Montenegro, Possible 3 Answers, in %
- Table 8. SWOT Analysis of the IT Services Market in Montenegro
- Table 9. Innovation Activities of Companies in the Period 2018-2022, in % (n=70)
- Table 10. Obstacles to Innovation Activities, in % (n=70)
- Table 11. Key Factors Contributing to Increased Innovation Activities, in % (n=70)
- Table 12. Planned New Products/Activities in the Next 3 Years, in % (n=56)
- Table 13. Sectors with Planned New Employments in the Next Three Years, in % (n=61)

List of Graphics

- Graph 1. Growth of digital investments by sectors since 2000 (average annual growth rate, %)..
- Graph 2. Structure of Montenegrin GDP, 2021, %
- Graph 3. Real GDP growth rate, 2010-2021, %
- Graph 4. ICT sector - gross value added and share in GDP, 2006-2021
- Graphic 5. Key indicators of ICT sector development, 2018-2022
- Graph 6. Key indicators of IT sector development, 2018-2022
- Graph 7. Revenues of ICT and IT Sector, 2018-2022
- Graph 8. Annual Growth Rates of Revenues in ICT and IT Sector, 2019-2022
- Graph 9. Current account balance for computer services, in million euros, 2014-2022
- Graph 10. Share of computer services in total exports, %, 2017-2022
- Graph 11. Company headquarters, % (n=70)
- Graph 12. Year of Establishment of Companies, in % (n=70)
- Graphic 13. Ownership of the company, %. (n=70)
- Graphic 14. Age of the CEO (Chief Executive Officer), (n=70)
- Graphic 15. Dominant business model, % (n=70)
- Graphic 16. Primary market of companies, % (n=70)
- Graphic 17. Net revenues achieved in 2022 compared to 2021, % (n=70)

Graphic 18. Significance of strategies for companies in the period 2018-2022, % (n=70)
Graphic 19. Was any innovation subject to intellectual property protection? % (n=70)
Graphic 20. Percentage of total annual revenues spent on research and development activities during 2022, % (n=70)
Graphic 21. Financial support for innovation activities in the period 2018-2022, % (n=70)
Graphic 22. Companies planning to create spinoffs and startups, % (n=70)
Graphic 23. Most needed measures to support further development of the IT sector in Montenegro, % (n=70)

Abbreviation List

AI - Artificial intelligence
BDP - Gross domestic product
BDV - Gross value added
CEJN - Electronic Public Procurement System
EU - European Union
ICT - Information and communications technology
IoT - Internet of things
ISIC - International Standard Industrial Classification of All Economic Activities
IT - Information technology
MBA - Montenegro Business Alliance
MMSP - Micro, small and medium-sized enterprises
NATO - North Atlantic Treaty Organization
NSAI - National strategy for Artificial Intelligence
NVO - Non-governmental organization
OECD - Organization for Economic Cooperation and Development
OTT - Over-the-top streaming service
PKCG - Chamber of Economy of Montenegro
ROI - Return on Investment
SAD - United States of America
UPCG - Employers' Union of Montenegro
WBIF - Western Balkans Investment Framework

INTRODUCTION

Before the COVID-19 pandemic swept the world, disrupting the global economy, information and communication technologies (ICT) were rapidly changing the rules of business. Thanks to its size and the nature of its products, the ICT industry, including telecommunications operators, computer and software manufacturers, and electronic equipment manufacturers, plays a significant role in driving economic growth, and this importance is becoming increasingly evident.

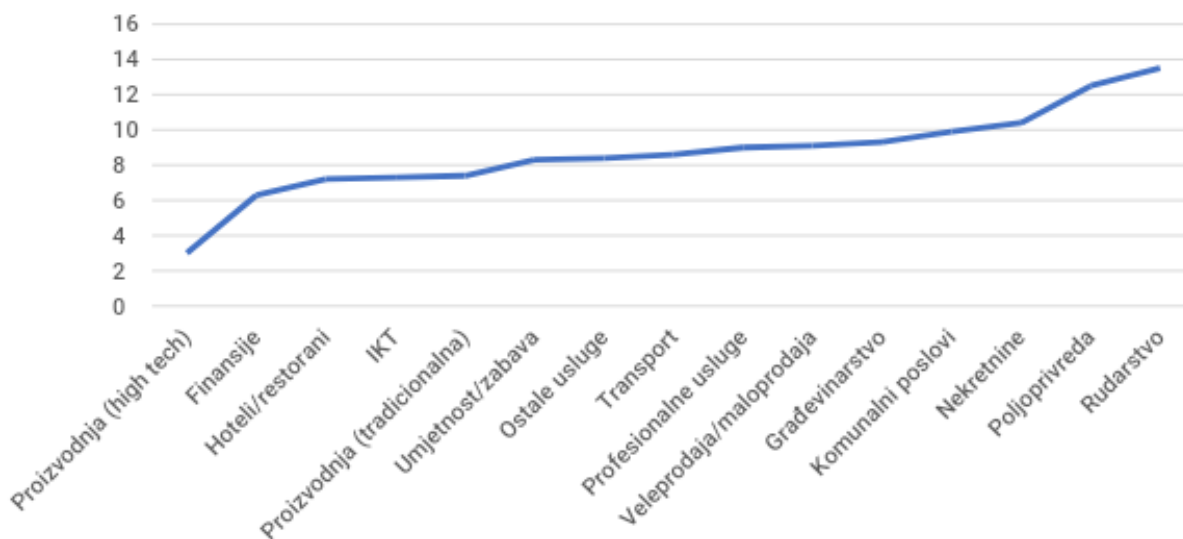
Throughout the world, in every industry and company, activities are being digitized. The development of new applications, new functions, and ideas make business faster, more efficient, and more reliable, opening up new areas for innovation. Numerous small digital steps forward have a strong impact on the economy as a whole. The digital economy is now firmly established as a driver of global growth. Industries and companies are transforming digital technologies (including broadband connections, cloud computing, big data, artificial intelligence, and the Internet of Things) into key factors of digital transformation.

A true digital economy is one in which industries, from agriculture to pharmaceuticals, have deeply embedded digital technologies into their production processes to increase economic performance. In the digital economy, companies from across the industrial spectrum are investing in digital technologies and utilizing them most productively. The mechanisms through which this occurs are complex. In addition to direct productivity gains from digital technologies, companies also have a range of indirect benefits that spill over within the company, to its competitors, and throughout the entire supply chain. Research conducted by Huawei, a Chinese multinational networking and telecommunications equipment and services company, and Oxford Economics, revealed that the long-term return on investment (ROI) for digital technologies in 2017 was 6.7 times higher than for non-digital investments. In 2016, the global digital economy was

valued at \$11.5 trillion, accounting for 15.5% of the global gross domestic product (GDP). Massive growth in the industrial internet is predicted by 2025, with high levels of digitization expected in industries worldwide. According to the aforementioned research, the digital economy is projected to account for 24.4% of global GDP by 2025.¹ While advanced economies are generally much more mature in terms of digitalization, developing countries are still catching up. In a sample of 50 countries covered in this research, the digital economy accounted for 18.4% of the GDP of advanced economies, compared to 10% of GDP in developing economies. Even among the least digitally advanced countries, the digital economy significantly contributes to GDP, indicating the widespread adoption of digital technologies in the modern global economy.²

The first wave of digital growth was initiated in the manufacturing sector, however, the digitization of business processes has gone a step further. The latest trends show that traditionally "least digital" sectors of the economy such as mining, agriculture, construction, and utility services, are experiencing the fastest growth in digital investments.³

Graph 1. Growth of digital investments by sectors since 2000 (average annual growth rate, in %)



¹ Huawei, Oxford Economics, *Digital Spillover*, link: https://www.huawei.com/minisite/gci/en/digital-spillover/files/gci_digital_spillover.pdf

² ibid

³ ibid

Source:

https://www.huawei.com/minisite/gci/en/digital-spillover/files/gci_digital_spillover.pdf

The acceleration of digital investments reflects companies' investments in more traditional sectors. For easier understanding of this trend, economic sectors are divided into two groups in the analysis. The first group consists of sectors traditionally based on data such as telecommunications and finance, and the second group includes other sectors of the economy. Research has shown that while data-based sectors were the earliest and largest investors in digital technologies in the 1990s and 2000s, in recent years, this second group has started to significantly increase their investments in digital technologies.

⁴Global ICT exports are projected to reach \$922 billion by 2026. This represents a 2.9% annual increase, with a growth of 9.2% since 2009. Ireland tops the list of countries with exports of \$159 billion in 2021, followed by India, the United States, and China in second, third, and fourth place, respectively. European ICT revenues are expected to reach €1.81 trillion by 2026. Since 2016, the market has grown by 3.1% annually. Germany is the top country with €317.6 billion in 2021, followed by the United Kingdom, France, and Ireland. Malta has the fastest growth rate of 16.5%.⁵

Digital technologies have become a key determinant of economic growth, international competitiveness, and national security. By influencing resource allocation, income distribution, and economic development, digital technologies play a significant role in shaping the developmental path of human civilization and the well-being of all citizens. The technology sector is undoubtedly a massive investment opportunity. It is the largest single segment of the market that "casts a shadow" on all others, including the industrial and financial sectors.

Today, more than ever, innovation is a crucial component of development and competitiveness. It is technology companies that are most closely associated with innovation and inventions.

In Montenegro, the ICT sector represents an important component of the country's economic development. The sector has a significant impact on the national economy and global competitiveness of Montenegro, as it supports all other sectors, as recognized and emphasized in the Smart Specialization Strategy. Montenegro was ranked 57th in the latest Global Competitiveness Report by the World Economic Forum for 2019 in terms of ICT adoption, among 141 ranked countries. According to the Global Innovation Index for 2022, which ranks world economies based on their innovation capabilities, Montenegro ranks 60th out of 132 economies represented in the GII.

⁴ ibid

⁵ ReportLinker, ICT Market Outlook 2022-2026, link:
<https://www.reportlinker.com/clp/global/597055#block-data-catalogue>

Statistics show that total revenues, number of active companies, and number of employees in the ICT sector in Montenegro are continuously growing. The J - Information and Communication sector contributed 3.5% to the national GDP in 2021. In 2022, the number of registered companies in this field was 6% compared to 4.2% and 3.8% in 2021 and 2020, respectively. The development of the ICT sector has been contributed by global trends as well as national level changes that are aligned with the strategic goal of Digital Montenegro, in the Strategy for Digital Transformation of Montenegro for the period until 2026. The strategic directions of development are focused on leveraging the benefits of modern technologies. Digital technologies help in the development of trade, better capital utilization, and strengthening national competitiveness. The rapid adoption of digital technologies in the economy has also meant rapid diffusion of the benefits they bring. Like energy and transportation, the internet has become an integral part of the state infrastructure and, therefore, a production factor in most activities of the modern economy. In this context, internet connectivity remains an important goal and a significant challenge that, in combination with the chosen strategic directions of development, should contribute to the creation of Digital Montenegro. Broadband access infrastructure, information security, human capital, e-business, e-participation, e-education, e-healthcare, e-governance, as well as research, innovation, and development, represent the backbone of the development of the information society in Montenegro.

According to the statement of the Agency for Electronic Communications and Postal Services (EKIP), Montenegro has the highest Digital Economy and Society Index for 2022 among six countries in the region. The result of the annual research of comparative data for four indicators - human capital, connectivity, adoption of digital technologies, and digital public services - for Montenegro is 35.1 points. For three indicators, namely human capital, connectivity, and adoption of digital technologies, Montenegro has better results than the average of the six countries in the Western Balkans. However, for digital public services, our country has the lowest result (5.8) in the region, with an average of 8 points, which is three times lower than the average of EU countries (16.8 points).

Montenegrin legislation related to ICT is fairly aligned with the legislation of the European Union (EU). The Law on e-Government was adopted in January 2020 and aims to improve the environment in which public administration provides services to citizens and businesses. The significance of the ICT sector is recognized in the daily functioning of both the public and private sectors, and it has become an integral part of enhancing competitiveness and productivity of all entities in the economy. ICT in Montenegro has become essential and present in all other priority areas of development, as well as in all economic and social aspects of life.

Montenegro is working on improving the capacity of its national ICT infrastructure. ICT development is taking place in the context of improving information systems in education, public administration, industry, and healthcare. In other words, digital governance is becoming a priority and a cornerstone for further public sector reform.⁶ Additionally, in order to increase their competitiveness, private companies are focused on innovation, which often heavily relies on ICT.

All of the above requires trained employees in the public and private sectors with developed digital skills that are continuously improved. At the same time, new employment requires certain ICT skills as mandatory. On the other hand, the lack of ICT skills significantly slows down the multiplier effects that modern technologies have on productivity growth. This raises the question of how much existing educational programs (formal and informal) in the field of ICT are aligned with market needs and how quickly they adapt to continuous changes.

ICT is generally used to refer to a broader, more comprehensive list of all components related to computer and digital technologies. However, information technology (IT), as a subsector of ICT, has proven to be a key determinant of economic growth in every country. It has a significant impact on the well-being of society as a whole, including resource allocation, income distribution, and knowledge flow. Information technology is one of the key factors that enable organizations to maximize productivity.

In the Montenegrin context, further improvement of the IT environment would significantly reduce business costs, increase the efficiency of companies, and streamline processes. Automation of tasks that are currently done manually saves time and reduces the possibility of errors. Faster flow of information, improved connectivity, facilitated communication among all sectors and the overall economy contribute to a safer and more efficient functioning of Montenegrin society. Reducing energy consumption and paper usage contributes to the preservation of Montenegro's natural environment. Moreover, with a quality IT system, companies in Montenegro will be able to accelerate their business, shorten the time needed to conceive, develop, and launch a product, all with the aim of becoming more competitive in the region and beyond. The ultimate goal is for IT infrastructure in Montenegro to be among the leading ones in the region, both in small and medium-sized enterprises and large companies.⁷

Despite their importance, structured data on the IT sector that would ensure evidence-based policy making, as well as attracting potential investors and guiding businesspeople, are not available. Initiatives launched in recent years need to be continuous in order to achieve sustainable results for IT development.

⁶ For more details, please refer to the "Public Administration Reform Strategy 2022-2026

⁷ ICT Committee, IT sector in Montenegro - Overview and Development Assumptions, available at <https://ticaret.gov.tr/data/5b8a43355c7495406a2276d1/%C4%B0T%20sector%20in%20Montenegro.pdf>

For this very reason, new policy creation processes require a thorough understanding of the sector, with recognized strengths, weaknesses, opportunities, and threats, which was the impetus for preparing this analysis.

The aim of the analysis and the methodology

The goal of this analysis is to present the state of the IT sector and companies engaged in information technology in Montenegro, as well as to highlight the significance and opportunities of the IT sector for the overall economic development in Montenegro. The analysis is based on a combination of multiple research methods, including a review of relevant policies and regulations, as well as other studies and reports on the ICT sector in Montenegro, including statistical sources, followed by the implementation of a quantitative research among companies in the IT sector, and a qualitative research through in-depth interviews and focus groups involving over twenty representatives from business associations, institutions supporting the IT sector, three universities that provide IT education, and individual IT companies. Interviews were also conducted with representatives from the public sector utilizing the services of the IT community in Montenegro.

For the purpose of quantitative research, a questionnaire was created for the survey, which included both open-ended and closed-ended questions. The questions were designed to obtain the following information:

- General information about the companies;
- Business results and environment;
- Innovation activities;
- Companies' expectations for the next 3 years;
- Preferred support measures.

The quantitative research was conducted from March 1st to March 20th, during which 70 companies in Montenegro were surveyed. The quantitative method involved the use of online tools. The preliminary findings of the quantitative research were used to initiate discussions in focus groups and through individual interviews to gain deeper insights and understanding of the identified challenges.

Considering the defined methodology and project objectives, the obtained results can be considered valid for forming recommendations to policymakers

Definition of ICT and IT sector

In order to manage something, we need to be able to measure the results of management, and in order to measure the achieved effects, we need to start with the definition of the ICT sector and IT subsector. When analyzing the ICT sector and processing statistical data, sectoral categorization as provided in the categorization by economic activity codes according to the Classification of Economic Activities (KD 2010), which is harmonized with the European Community's Classification of Economic Activities (NACE Rev.2)⁸ cannot be followed. This is because the ICT sector, although most of its activity codes belong to sector J - Information and Communication, is only its subsector and includes additional activity codes.

Therefore, the classification of the Organisation for Economic Co-operation and Development (OECD) is used to monitor the ICT sector, which is based on ISIC Rev.4.⁹ In 1998, the OECD member countries agreed to define the ICT sector as a combination of manufacturing and service activities that record, transmit, and display data and information electronically. This definition, based on international standard classification, is considered the first step in obtaining initial measurements of key indicators of the ICT sector.¹⁰ The principles on which the definition is based are as follows:

- For manufacturing industries, products of candidate industries must be intended for information processing and communication functions, including transmission and display, and must use electronic processing for detection, measurement, and/or recording of physical phenomena or control of physical processes.
- For service industries, products of candidate industries must enable information processing and communication functions electronically.¹¹

According to ISIC Rev. 4, the ICT sector includes the following:

ICT manufacturing industry, which includes ISIC codes:

- 2611 - Manufacture of electronic components,
- 2620 - Manufacture of computers and peripheral equipment,
- 2630 - Manufacture of communication equipment,
- 2640 - Manufacture of consumer electronics,
- 2680 - Manufacture of magnetic and optical media.

ICT trade, which includes ISIC codes:

- 4651 - Wholesale of computers, computer peripheral equipment, and software,

⁸ Eurostat, *Statistical classification of economic activities in the European Community*, available at <https://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF>

⁹ United Nations, *ISIC - International Standard Industrial Classification of All Economic Activities – ISIC Rev. 4*, available at https://unstats.un.org/unsd/publication/seriesm/seriesm_4rev4e.pdf

¹⁰ OECD, *The OECD definition of the ICT Sector*, available at: <https://www.oecd.org/digital/ieconomy/2771153.pdf>

¹¹ *ibid*

- 4652 - Wholesale of electronic and telecommunications equipment and parts (supplemented with 4741 - Retail sale of computers, peripheral units, software, and telecommunications equipment in specialized stores and 4742 - Retail sale of audio and video equipment in specialized stores).¹²

ICT services are divided into telecommunications, which include ISIC codes:

- 6110 - Wired telecommunications activities,
- 6120 - Wireless telecommunications activities,
- 6130 - Satellite telecommunications activities,
- 6190 - Other telecommunications activities¹³ and

computer programming, consulting and related activities, information service activities, and repair, which include the following ISIC codes:

- 5820 - Software publishing
- 6201 - Computer programming activities
- 6202 - Computer consultancy and management activities
- 6209 - Other information technology and computer services activities
- 6311 - Data processing, hosting and related activities
- 6312 - Web portals
- 9511 - Repair of computers and peripheral equipment
- 9512 - Repair of communication equipment¹⁴

In other words, the ICT sector includes: telecommunications activities, the IT sector, and repair services.

When we look specifically at the IT sector, it encompasses computer programming, consulting and related activities, and information service activities, all of which are covered by the following activity codes:

- 5820 - Software publishing, including publishing of computer games
- 6201 - Computer programming
- 6202 - IT consulting activities
- 6209 - Other IT services
- 6311 - Data processing, hosting and related activities, and application service provisioning, etc.
- 6312 - Web portals¹⁵

¹² United Nations, *International Standard Industrial Classification of All Economic Activities (ISIC), Rev.4*, link: https://unstats.un.org/unsd/publication/seriesm/seriesm_4rev4e.pdf

¹³ *ibid*

¹⁴ *ibid*

¹⁵ International Telecommunication Union, *ICT sector classification standards proposals based on ISIC Revision 4 (industry international classification standards)*, available at: https://www.itu.int/dms_pub/itu-d/md/02/isap2b.1.1.1/c/D02-ISAP2B.1.1.1-C-0024!!PDF-E.pdf

During the process of mapping and assessing the key indicators for the IT sector in Montenegro, certain circumstances have affected the accuracy of the data, primarily due to the registration of economic entities' activities. Upon reviewing the Central Register of Economic Entities, it was observed that some companies are registered with a primary activity that is not actually their main focus, as they are active in a different industry. Additionally, a limiting factor is the fact that some economic entities have not updated their registration data regarding their activities when transitioning from the official KD 1998 to KD 2010 classification codes.

Limitations in the assessment also arise from companies that engage in multiple different activities but are registered under a single activity, which certainly impacts the assessment of individual sectors' contributions.

These limitations can be overcome through occasional implementation of specialized, well-designed research on a sample, where extrapolation of the obtained results can characterize the sectors individually, as well as the IT sector as a whole.

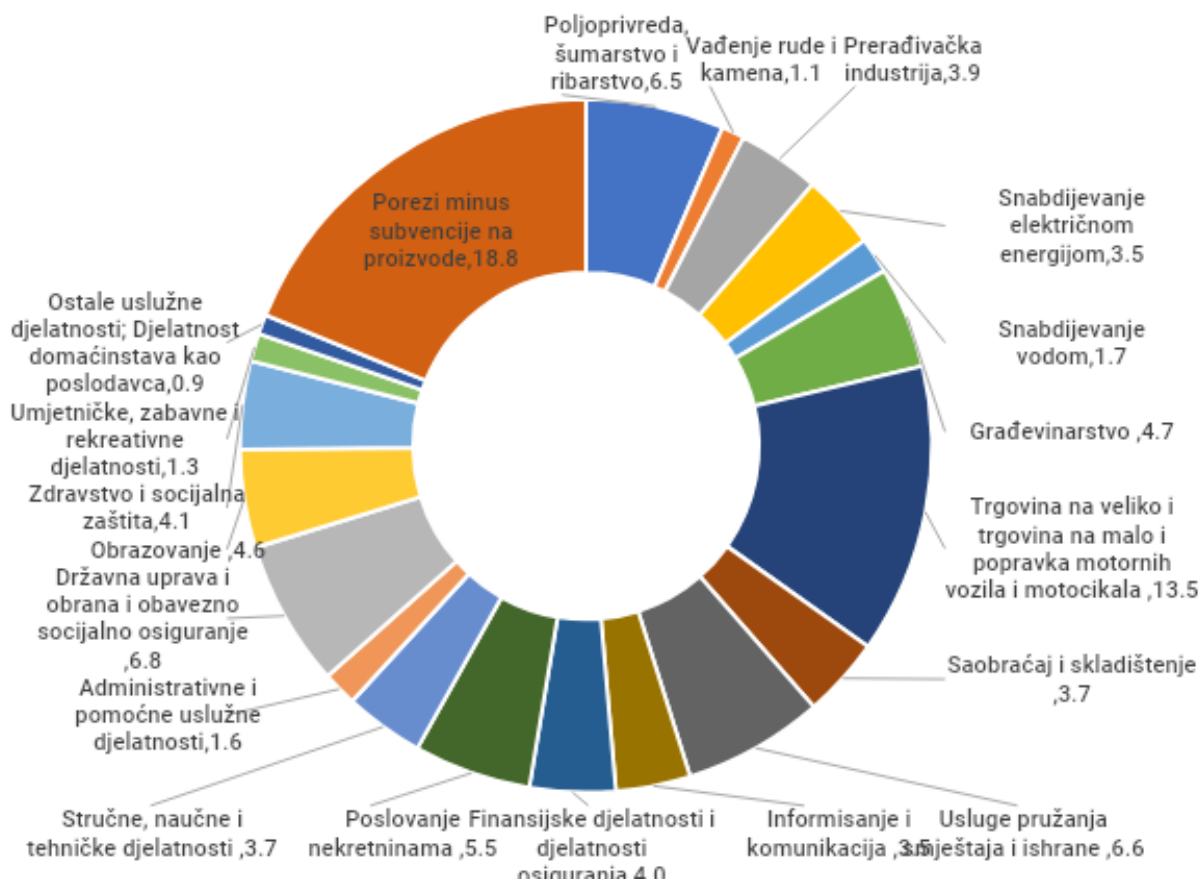
The structure of the Montenegrin economy and macroeconomic indicators

In the early 1990s, the economic structure of Montenegro was based on industrial production, which accounted for 35% of the social product (in 1990). Montenegrin social enterprises were oriented towards producing means of reproduction for the large Yugoslav market and final processing in other republics. The breakup of the state (SFRY) and the loss of markets, wars in the immediate surroundings, hyperinflation, UN and EU sanctions, caused tectonic changes in the economic structure, which gradually shifted towards the service sector, at the expense of agriculture and industry.¹⁶ Since gaining independence (in 2006), economic development has been characterized by, among other things, an expansion of construction and pressures caused by internal migration. The attractiveness of natural resources and the growth of capacity in the tourism sector contributed to tourism, along with related sectors, accounting for a quarter of the gross domestic product (GDP) before the crisis caused by the COVID-19 pandemic. The structure of the Montenegrin economy (Graph 2) has been permanently changed from a "pre-industrialized" and "rigid" economy oriented towards the Yugoslav market, to an open, euroized, and service-oriented economy that heavily depends on

¹⁶ Ministry of Economy, Industrial Policy of Montenegro 2019-2023, available at: <https://www.gov.me/dokumenta/b6d2c966-ac8b-409a-bcf5-acdce90c36d9>

external demand, with a development model based on foreign direct investment (FDI) and the strengthening of the service sector.¹⁷

Graph 2. Structure of Montenegrin GDP in 2021, in %



Source: MONSTAT

After recovering in 2010, from 2011 to 2019, the Montenegrin economy achieved a real GDP growth rate of 2.9% annually, with GDP increasing from 3.23 billion euros in 2011 to 4.03 billion euros in 2019.

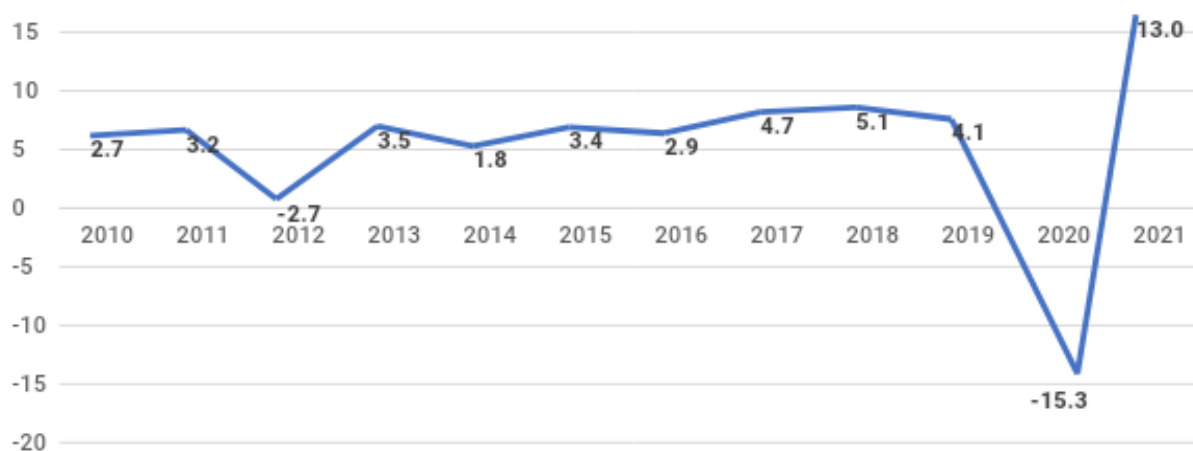
The COVID-19 pandemic had a significant negative impact on the economy of Montenegro in 2020. According to data from MONSTAT, Montenegro's economy recorded a negative real GDP growth rate of 15.3% in 2020, while in 2021, a real GDP growth rate of 13.0% was registered.

¹⁷ ibid

The economic recovery has been reflected across all sectors, especially in tourism, which was the most affected during the pandemic period.

The economic recovery continued in 2022, however, the pandemic was replaced by another strong external factor of influence: Russia's aggression on Ukraine and the ongoing war in Ukraine, which has had a global impact on energy situation and inflation. According to preliminary data, during 2022, an average quarterly real GDP growth rate of 6.6% was achieved. Inflation has exceeded 17%, compared to the average inflation rate of 9.2% in EU countries.

Graph 3. Real GDP growth rate, 2010-2021, in %



Source: [MONSTAT](#)

The total foreign trade of goods of Montenegro for January-December 2022 amounted to 4.240 million euros, indicating a growth of 44.1% compared to the same period of the previous year. The value of goods exports was 700.2 million euros, and imports amounted to 3.539.8 million euros.¹⁸

Table 1. Montenegro - key macroeconomic indicators, 2018-2021

	2018.	2019.	2020.	2021.	2022.
GDP growth rate (%)	5,1	4,1	-15,3	13,0	
Inflation, consumer price index (%)	1,6	1,0	-0,9	4,6	17,2
Exports of goods and services (million EUR)	1,999	2,163	1,080	1,979	0,7
Imports of goods and services (million EUR)	3,112	3,208	2,539	2,903	3, 5

¹⁸ MONSTAT, <https://monstat.org/cg/page.php?id=17&pageid=17>

Foreign direct investment - net (million EUR)	322,5	305,1	467,5	580,9	782
Unemployment rate (% of population, Labor Force Survey)	15,2	15,1	17,9	17,1	13%
Nominal GDP (expressed in billions of €)	4,7	4,9	4,2	4,9	

Source:

<https://www.ebrd.com/strategy-and-policy-coordination/strategy-in-montenegro-montenegro.pdf>;

<https://www.gov.me/cyr/clanak/rekordne-strane-direktne-investicije-u-2022-godini-115-milijardi-eura>

In Montenegro, in 2022, there were 2.2 million tourist arrivals and 12.5 million overnight stays. Of the total number of overnight stays, 95.5% were made by foreign tourists, and 4.5% by domestic tourists. In terms of the structure of overnight stays by foreign tourists in 2022, tourists from Serbia had the highest number of overnight stays (25.5%), followed by the Russian Federation (16.4%), Bosnia and Herzegovina (9.9%), Germany (5.9%), Ukraine (4.9%), Kosovo (4.0%), and the United Kingdom (3.3%). Tourists from other countries accounted for 30.1% of overnight stays.

Consumer prices in December 2022, compared to the same month of the previous year, increased on average by 17.2%. The highest impact on the monthly inflation rate was due to price increases in the following groups: actual rents paid by tenants for primary residence; accommodation services; milk, cheese, and eggs; vegetables; other appliances and personal care products; vehicle maintenance and repair; solid fuels; and meat. Consumer prices for the period of January-December 2022, compared to the same period of the previous year, increased on average by 13.0%.¹⁹

According to available data for 2022, the number of active population increased by 10%, which means an increase from 273,400 to 300,700 inhabitants. The employment rate increased from 46.5% to 52.3%, or by 5.8 percentage points. In the structure of employed persons, the share of those with permanent employment or indefinite-term employment contracts decreased, while the share of those with fixed-term employment contracts remained approximately at the same level.

The number of unemployed persons, according to the Labor Force Survey, decreased from 40,400 to 39,200, or by 3%, in the third quarter of 2022 compared to the third quarter of 2021. The unemployment rate, according to the data of the Statistical Office

¹⁹ Source: MONSTAT

of Montenegro (MONSTAT), decreased from 14.8% to 13%. For men, it decreased from 16.3% to 15.1%, and for women from 12.9% to 10.5%.²⁰

Montenegro is in the middle stage of developing a knowledge-based economy. There is still a structural mismatch between labor demand and labor supply, which particularly affects innovative companies.²¹

The role and trends of ICT sector development

The developed ICT sector is a prerequisite for achieving the strategic goal of digitally transformed Montenegro, as defined by national strategies in the field of information society development, smart specialization, and Montenegro's accession program to the EU.

Over the past fifteen years, the contribution of the ICT sector to the gross domestic product has declined, although gross value added has been increasing, especially since 2014.

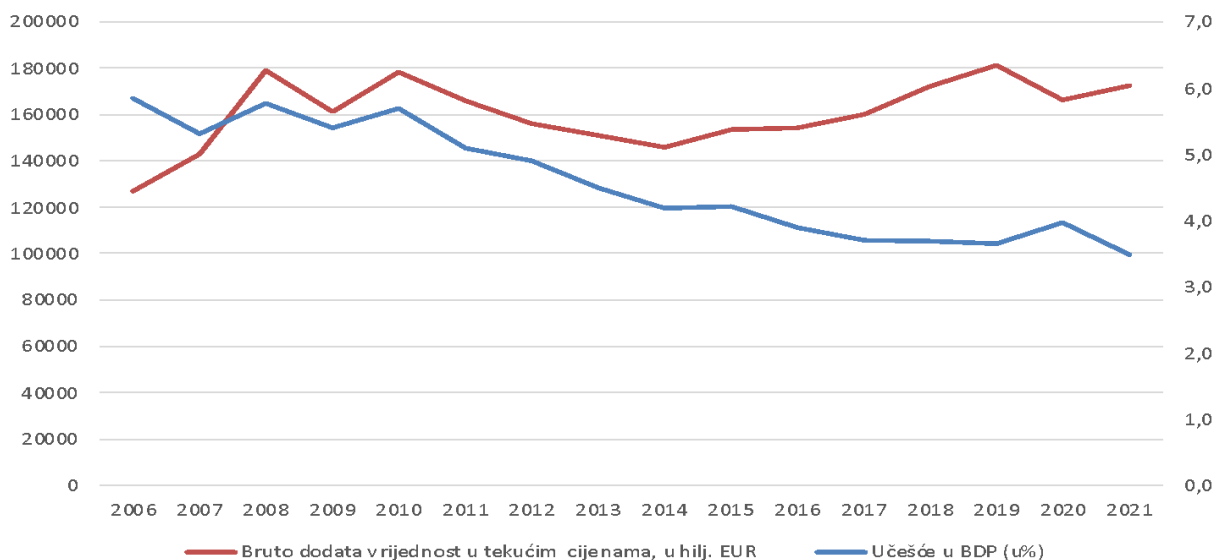
In recent years, Montenegro has experienced growth in the ICT sector in terms of the number of companies, employees, revenues, and profits. In 2021, 5% of active companies, 4% of all employees, 5% of revenues, and 4% of earnings were registered in the ICT sector.²² In 2022, ICT companies comprised 5.5% of all legal entities in Montenegro, generating 4.34% of employment and 4.6% of total revenues.

Graph 4. ICT sector - gross value added and share in GDP, 2006-2021

²⁰ Employment Agency of Montenegro, Analysis of Labor Market Supply, Demand, and Employment in Montenegro in 2022, available at: <https://www.zzzcg.me/wp-content/uploads/2023/03/Analiza-ponude-tra%C5%BEije-i-zapo%C5%A1ljava-na-tr%C5%BEi%C5%A1tu-rada-u-Crnoj-Gori-u-2022.-godini.pdf>

²¹ European Bank for Reconstruction and Development (EBRD), *Strategy for Montenegro 2021-2022*, available at <https://www.ebrd.com/strategy-and-policy-coordination/strategy-in-montenegro-montenegrin.pdf>

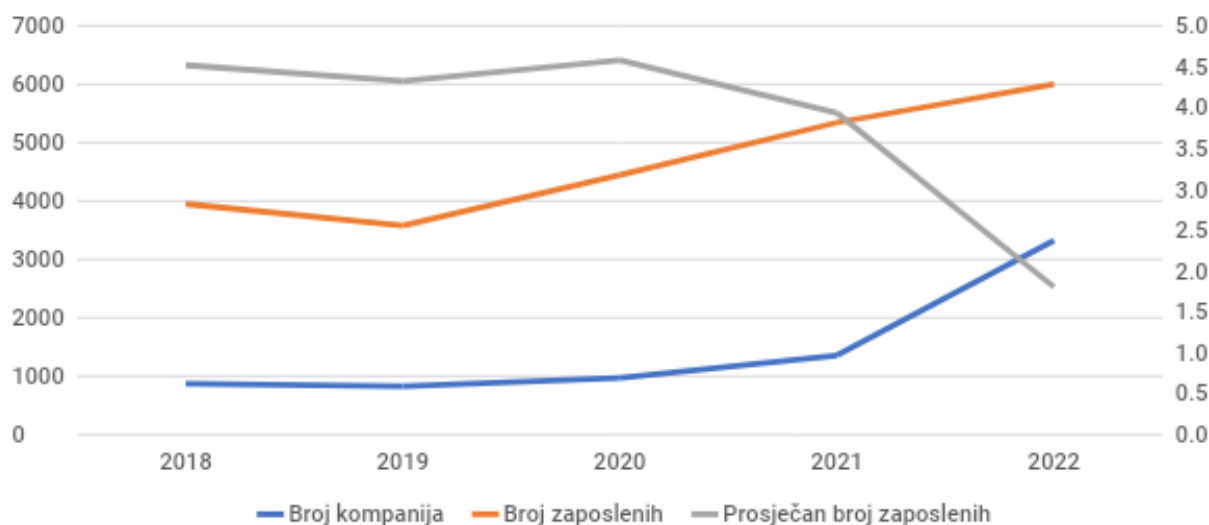
²² Chamber of Economy of Montenegro, Analysis of the Montenegrin Economy in 2022, available at PKCG_cg-privreda-2022.pdf



Source: [MONSTAT](#)

Within the ICT sector, the main contributors to positive growth trends are the subsectors of telecommunications and computer programming, consulting, and related activities. During 2022, these trends were further strengthened due to the impact of the Russian aggression on Ukraine and the war that redirected numerous companies and employees in this sector to other locations, including Montenegro. With the increase in the number of registered companies, there has been a decrease in the average number of employees per company.

Graph 5. Key indicators of ICT sector development, 2018-2022

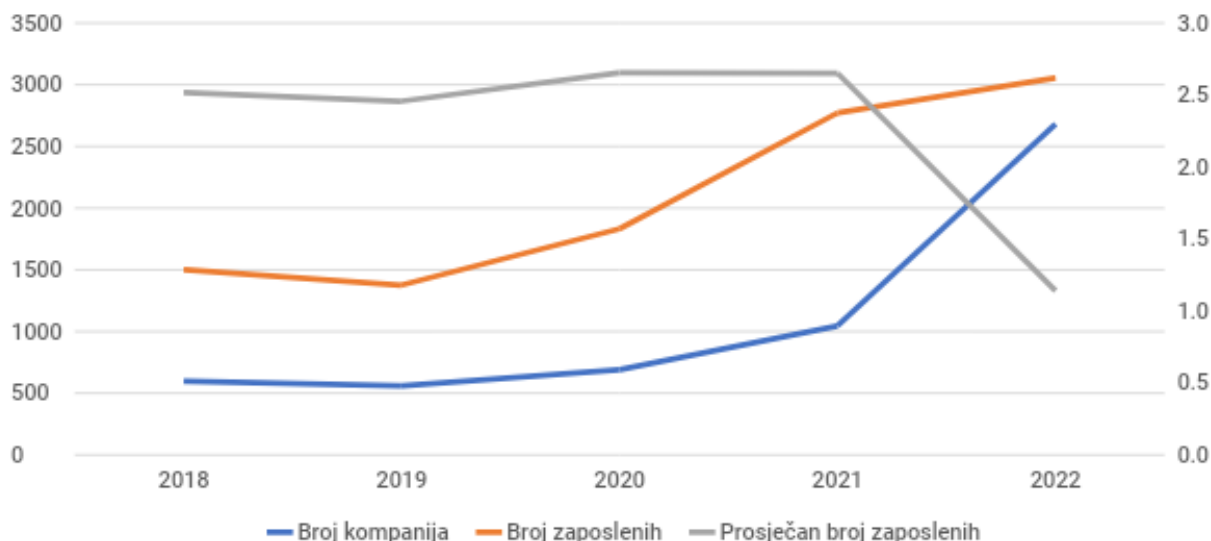


Source: UPC – financial reports to the Chamber of Economy 2018-2021, 2022 – CRPS

Development of IT sector

In 2022, there were 2,583 active companies in the IT sector, representing an increase of 88.1% compared to the previous year. These companies encompass activities such as computer programming, consulting, and other related information service activities. Within the IT sector, there were 5,605 employees, marking a 109.5% increase from the previous year. The revenue of the IT sector amounted to 197.5 million euros, reflecting a 103% growth compared to the previous year. There was also a recorded increase in the average number of employees in IT companies in Montenegro during the observed period (Graph 6).

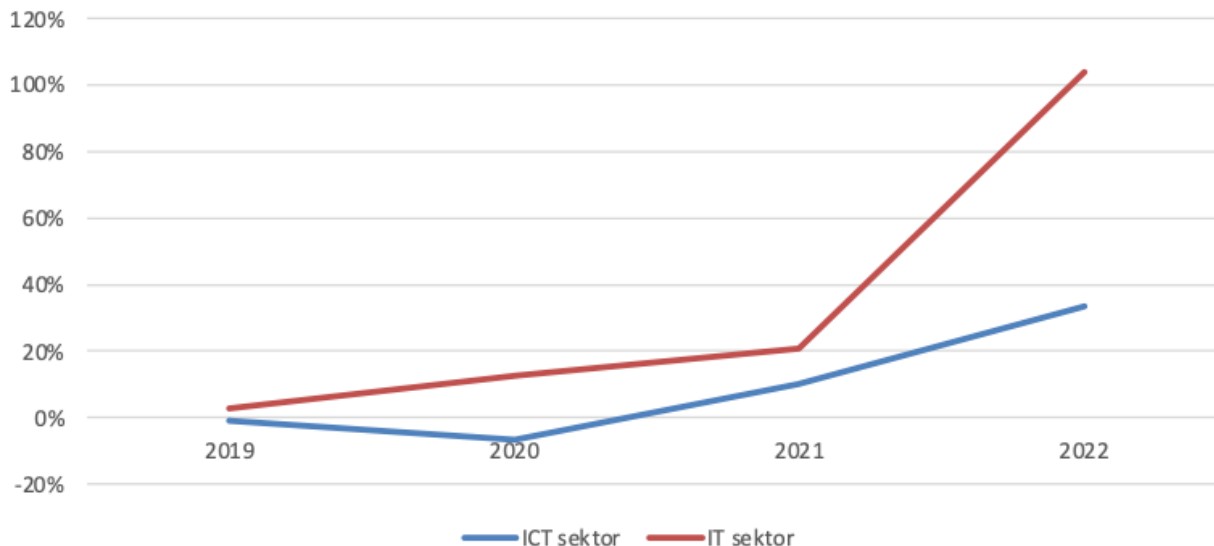
Graph 6. Key indicators of IT sector development, 2018-2022



Source: UPC – financial reports to the Chamber of Economy 2018-2021, 2022 – CRPS
During the observed period, both the ICT and IT sectors experienced revenue growth. Graphs 7 and 8 illustrate the movement of revenues in nominal amounts and annual growth rates. We can conclude that the ICT sector was not immune to the impact of the global COVID-19 pandemic, as it experienced a 6% decline in revenue in 2020. In contrast, the IT sector continued to see increasing revenues even in that year.

Graph 7. Revenue Generated by the ICT and IT Sectors, 2018-2022

Graph 8. Annual Growth Rates of Revenue in the ICT and IT Sectors, 2019-2022



Source: Tax and Customs Administration, based on financial reports

Public Procurements for Digital Services

Thanks to the use of the electronic public procurement system (CEJN), the value and scope of the market for the IT sector in Montenegro in relation to public administration (at the national and local level) can be determined. When announcing public procurement calls, one of the mandatory items is the CPV code, which defines the type of goods and services that are the subject of the public procurement.²³

²³ A request has been sent to the Public Procurement Policy Directorate for the purpose of determining the market size. The request includes the following CPV codes:

720

721

722

723

724, excluding

- 72400000-4 Internet services
- 72410000-7 Provider services
- 72411000-4 Internet service providers (ISP)
- 72412000-1 Electronic mail services providers
- 72415000-2 Website hosting services
- 72417000-6 Internet domain names
- 72420000-0 Internet development services

72511000-0 Network management software services

72512000-7 Document management services

72513000-4 Office automation services

The table below provides an overview of key indicators for public procurement of IT services for the years 2021 and 2022.

Table 2. Value of public procurement of IT services, 2021-2022

	2021	2022
Number of public procurement procedures	120	119
Number of unique buyers	40	46
Contracted values	3,71 miliona eura	5,65 miliona eura
Average value of the procurement procedure	30.954 eura	47.510 eura

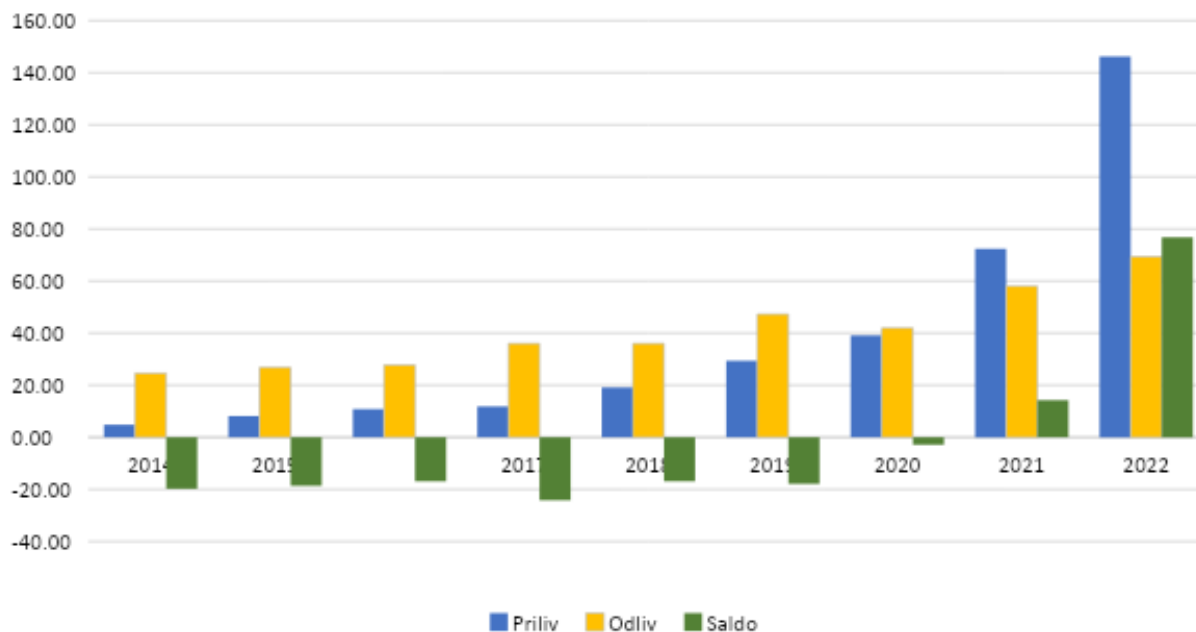
Source: Ministry of Finance

Although the available data is not sufficient to interpret trends (data in CEJN is available from 2021), despite the unchanged number of public procurement procedures in 2022 compared to 2021, and a slight increase in the number of unique buyers in 2022, there was a growth of 52.3% in the value of public procurement and 53.5% in the average value of contracted deals.

It is important to note that a significant portion of IT service contracts in Montenegro are awarded through international organizations (such as the World Bank, EBRD, UN Development Programme, etc.). These contracts are for large-scale development of systemic platforms, such as information systems in healthcare, tax administration, social protection, judiciary, etc. These projects are often awarded to international consortia with limited participation of domestic companies due to lack of references. One major drawback of such projects, as confirmed by continuous practice, is inadequate software maintenance after implementation, as international consortia usually do not retain local representation that could respond promptly.

Due to the limited domestic market, Montenegrin companies are turning to international markets. Graph 7 shows the trend of inflow, outflow, and balance of the current account for computer services in millions of euros over the past 8 years. While the outflow levels vary, the average annual growth rate of inflow from computer services exports in the mentioned period was 56%. In the last two years, the balance is positive, meaning that the inflow from exports is higher than the registered outflow.

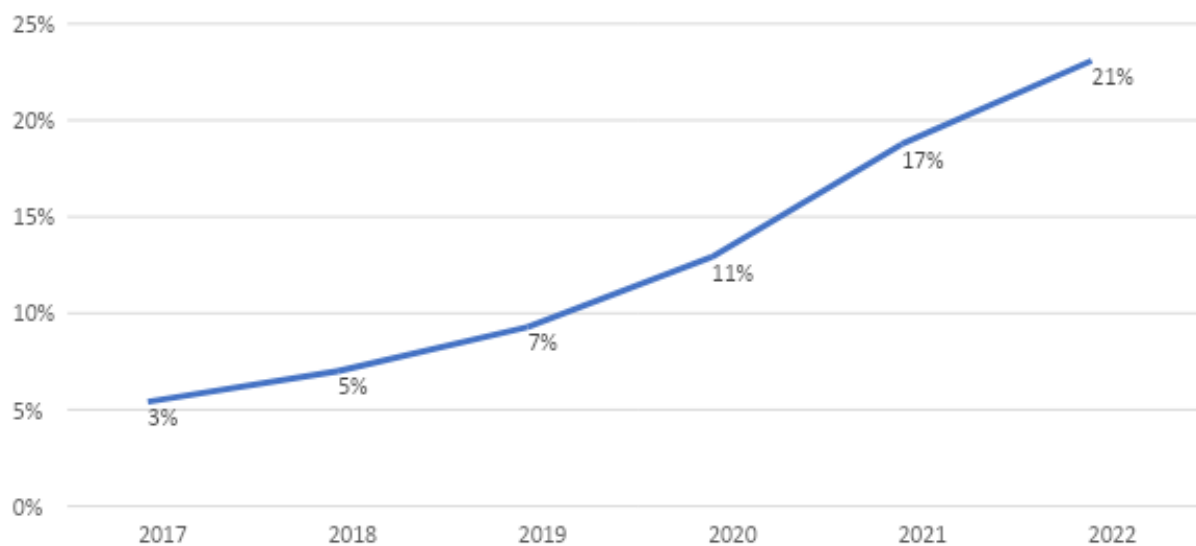
Graph 9. Current account balance for computer services, in million euros, 2014-2022



Source: CBM

Export activities of computer services have an increasing share in the total Montenegrin exports, as shown in graph 10.

Graph 10. Share of computer services in total exports, in %, 2017-2022



Source: CBM, MONSTAT

Legal, Strategic, and Institutional Framework for the Development of the IT Sector in Montenegro

The following is an overview of the frameworks in which the IT sector is developing in Montenegro, with a focus on regulation (legal framework), strategic documents that define development guidelines, and institutions that provide support or are responsible for implementing strategic guidelines.

General overview of the legal aspect of IT sector development in Montenegro

In the past few years, and especially after the establishment of the non-governmental association ICT Cortex, the IT sector in Montenegro has experienced rapid development in terms of the establishment and growth of many companies whose main activity is in the field of information technology. There is also a large number of young people who choose to specialize in this field or change their professional orientation to the IT sector, due to the growing trend of promising business opportunities in the IT sector.

Montenegro's legal regulations have attempted to keep up with the accelerated development of the IT sector by enacting key laws that define current IT innovations and support the future development of IT products and services. The following are the main laws that have influenced or may influence the development of the IT sector in the future.

(i) Law on Business Entities

As a *lex generalis* for the operation of business entities, the Law on Business Entities of Montenegro ("Official Gazette of Montenegro", No. 065/20, 146/21) ("Law on Business Entities") is certainly the most relevant law for the process of starting a business of an IT company in terms of choosing the legal form of the business entity and organizing corporate governance within the company. The currently valid Law on Business Entities came into force in July 2020 and represents a more advanced and modern legal solution compared to the previous law. The Law on Business Entities prescribes that the forms of conducting business activities are general partnership, limited partnership, joint-stock company, limited liability company, sole proprietorship, and branch of a foreign company.

Perhaps the most common form of independent work in the IT sector is freelancing. Although the term "freelancer" is not defined by the Law on Business Entities, it is closest to the legal form of a sole proprietor. It was only in August 2020, with the adoption of the Law on Innovation Activity ("Official Gazette of Montenegro", No. 082/20) ("Law on Innovation Activity"), that a legal definition of a freelancer was established as follows: a freelancer is a domestic or foreign natural person residing in

Montenegro who independently performs innovative activities by providing intellectual services for the needs of domestic and foreign legal and natural persons. The definition of the term through the Law on Innovation Activity represents a step forward in legal regulation of independent work in the IT sector. However, there is still a lot of room for regulating the status of freelancers in terms of registration and taxation through Montenegro's legal regulations, which would be advisable to do after analyzing comparative practices and existing legal frameworks in other countries.

(ii) Law on Innovation Activities and Law on Incentives for Research and Innovation

In mid-2020, two significant laws were adopted for the development of the IT sector in Montenegro, namely the aforementioned Law on Innovation Activities and the Law on Incentives for Research and Innovation ("Official Gazette of Montenegro", no. 082/20) ("Law on Incentives for Research and Innovation"). Both laws contain certain measures to strengthen the innovation system, in order to contribute to the economic and sustainable development of Montenegro.

The Law on Innovation Activities stipulates that subjects of innovation activities can be (i) subjects performing innovation activities; (ii) subjects of innovation infrastructure; (iii) subjects investing in innovation activities; and (iv) other subjects of innovation activities. The law further provides for the decentralization of financing of innovative programs and projects by allowing public calls for funding to be published by state administration bodies or local self-government units, as well as the fund that promotes innovation activities.

Certainly, one of the important roles in implementing the Law on Innovation Activities is played by the Innovation Fund, established under the same law, through the publication of public calls and allocation of funds from the budget of the Fund. The Government of Montenegro has decided to redirect part of the funds obtained through the economic citizenship program to the budget of the Innovation Fund through an amendment to the relevant sublegal act, which has significantly increased the capacity of the Fund for allocating funds to subjects of innovation activities.

The Law on Incentives for Research and Innovation provides for incentive measures for the development of research and innovation through reductions, exemptions, or benefits related to (i) personal income tax and surtax on income; (ii) contributions for mandatory social insurance; (iii) corporate income tax; (iv) fees for communal equipment of building land; (v) use of real estate and/or land owned by the state; and (vi) property tax. The total amount of all reductions, exemptions, or benefits, obtained by using incentive measures, for one legal or natural person, cannot exceed 300,000 euros on a three-year basis, provided that subjects of innovation activities can use multiple incentive measures simultaneously, subject to the total amount of incentive measures not

exceeding the allowed limit, in accordance with the law regulating state aid. Interested parties must submit a request to obtain the status of incentive measures beneficiary. Beneficiaries of incentive measures can be domestic and foreign legal and natural persons engaged in scientific research and innovation activities in Montenegro, as well as other legal and natural persons who invest funds or are otherwise connected to these activities, in accordance with the conditions prescribed by this law and the law regulating state aid.

The Law on Incentive Measures for the Development of Research and Innovation has encouraged a certain number of companies to invest in innovative activities in order to obtain tax benefits or other measures prescribed by this law. It is expected that this number will increase in 2023, following the establishment of a practice in obtaining the status of incentive measures beneficiaries and the award of incentive measures by competent administrative bodies, which will clarify certain legal uncertainties contained in the text of the law.

(iii) The Law on Payment Transactions

The Law on Payment Transactions was amended in September 2022 (Official Gazette of Montenegro, No. 062/13, 006/14, 111/22) ("Law on Payment Transactions") in the Parliament of Montenegro. The main reason for the amendments to the Law on Payment Transactions is to align it with Directive (EU) 2015/2366 of the European Parliament and of the Council on payment services in the internal market ("PSD2"), in line with Montenegro's obligations under Negotiation Chapter 4 - Free Movement of Capital. PSD2 is a revised directive on payment services whose main goal is to promote innovation, support increased competition and transparency across the European payment market.

The Law on Payment Transactions and PSD2 become significant for the IT sector as they open the way for IT companies to enter the market for payment services in Montenegro, through the definition of two new payment services - payment initiation services and account information services. By introducing these new payment services, the market for payment services is opened to new providers of these services, specifically payment initiation service providers and account information service providers. In countries that have already implemented PSD2, these providers of payment services are mostly IT companies.

It is understandable that the introduction of PSD2 has caused a kind of "earthquake" in traditional banking. This is particularly due to the fact that according to PSD2 and the adopted amendments to the Law on Payment Transactions, banks are obliged to open their IT systems to new providers of payment services, mostly IT companies, using application program interfaces ("APIs") when a client initiates a transaction through them. This way of connecting data between banks and third-party payment service providers via APIs is called open banking. Many banks in Europe saw the introduction of

PSD2 as a motivation and reason to accelerate the process of digitization, as well as to potentially invest in IT startups that deal with payment initiation services or account information services. It is expected that something similar will happen in Montenegro after the Law on Payment Transactions comes into force, which will be particularly significant for fintech companies.

The amendments to the Law on Payment Transactions will come into force on October 8, 2023, by which date the Central Bank of Montenegro is obliged to prepare bylaws that accompany the aforementioned amendments.

(iv) Law on Digital Assets

The Central Bank of Montenegro has been announcing the preparation of a draft Law on Digital Assets for some time, which would be in line with the legal framework of the European Union, although it is not yet available to the public. It is expected that this law will regulate cryptocurrencies for the first time in Montenegro, as well as the use of blockchain technology, which goes beyond the scope of financial markets and cryptocurrencies. Despite the name, cryptocurrencies are not officially recognized as a means of payment or currency in Montenegro, but are considered as financial instruments. It should be noted that although cryptocurrencies are not legally defined, there is no prohibition on buying/selling cryptocurrencies, and it is widely known that such transactions are practiced in Montenegro. The adoption of the Law on Digital Assets and the legal regulation of this matter would provide legal certainty for businesses in this field and contribute to the development of not only fintech companies, but also other IT companies that would develop software solutions for the application of blockchain technology in other areas of public or private activity in Montenegro.

Strategic Framework for the Development of the IT Sector in Montenegro

In order to develop information technology, strategic documents have been adopted that represent guidelines and a basis for smart growth and development of Montenegro. The proposals and steps identified as crucial in the strategies will direct further activities aimed at enabling the digital transformation of all social and economic sectors.

European guidelines and recommendations in this area are defined by the Digital Agenda for Europe by 2020, the Strategy for the Digital Single Market, and the EU Action Plan for eGovernment 2016-2020. In March 2021, the European Commission presented a vision, goals, and pathways for a successful digital transformation of Europe by 2030. The EU's Digital Decade has four key areas:

- ICT skills: Digital skills will be essential for strengthening collective resilience as a society. Basic digital skills for all citizens and the ability to acquire new

specialized digital skills for the workforce are prerequisites for active participation in the digital decade.

- Business transformation: By 2030, digital technologies including 5G, Internet of Things, edge computing, artificial intelligence, robotics, and augmented reality will be at the heart of new products, production processes, and new business models, based on fair data sharing.
- Secure and sustainable digital infrastructure: Europe will achieve digital leadership by building it on sustainable digital infrastructure, which includes connectivity, microelectronics, and big data processing capabilities, as they are drivers of technological development and support industrial competitive advantage.
- Digitalization of public services: The EU aims to ensure that democratic life and online public services are fully accessible to everyone, including persons with disabilities, by making them easy to use, efficient, and personalized. Provided e-voting would encourage greater public participation in democratic life. User-centric services will enable all citizens and businesses of all sizes to influence the direction and outcomes of government activities.²⁴

The European path to a digitized economy and society focuses on solidarity, prosperity, and sustainability in empowering citizens and businesses, ensuring the security and resilience of its digital ecosystem and supply chains. The Declaration on Digital Rights and Principles for the Digital Decade puts people at the center, emphasizing that digital technologies should protect human rights, support democracy, and ensure that all digital players act responsibly and securely. Additionally, emphasis is placed on freedom of choice, security and safety, solidarity and inclusion, as well as participation and sustainability.²⁵

Digital devices need to support sustainability and green transition. People need to be aware of the environmental impact and energy consumption of their devices. The Digital Agenda for Europe emphasizes the need for maximum support for innovative cross-border e-government solutions, highlighting the importance of ensuring full interoperability of e-government services by overcoming legal, organizational, technical, and semantic barriers. To achieve this efficiently and effectively, it is necessary to consider the European Interoperability Framework (EIF) 2.0, whose core principles are subsidiarity and proportionality, user-centricity, inclusiveness and accessibility, security and privacy, multilingualism, administrative simplification, transparency, information

²⁴ European Commission, *2030 Digital Compass: the European way for the Digital Decade*, available at: <https://eufordigital.eu/wp-content/uploads/2021/03/2030-Digital-Compass-the-European-way-for-the-Digital-Decade.pdf>

²⁵ European Commission, *Europe's Digital Decade: digital targets for 2030*, available at: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en#digital-rights-and-principles

protection, openness, reusability, technological neutrality, adaptability, effectiveness, and efficiency.

One of the significant activities of this Action Plan is the further development and expansion of the Interoperability Solutions for European Public Administrations - ISA2 project, which specifically addresses interoperability but also other areas of e-government, such as electronic identification (eID). In this regard, the STORK (Secure idenTity acrOss boRders linKed) project is leading the way, aiming to create an interoperable cross-border system across the EU that allows national electronic identity systems to be used in all member states. The development and implementation of such large-scale multi-country projects serve to foster and promote innovative cross-border solutions.²⁶

At the national level, the Accession Program of Montenegro to the European Union 2022 - 2023 (PPCG) is a strategic document that covers 33 negotiation chapters and is adjusted annually to changes within the EU legal development process. Montenegro opened Chapter 10 - Information Society and Media at the Intergovernmental Conference held on March 31, 2014, in Brussels. Chapter 10 includes the following sub-areas: electronic communications, information society services, and audiovisual policy. Chapter 10 brings numerous benefits to the citizens of Montenegro, both for service providers and users. The benefits of this chapter are reflected in widespread internet access (aiming to provide fast internet access to everyone, regardless of physical distance), electronic communications (mobile and fixed telephony), a large number of electronic services and procedures for more efficient and faster procedures (company registration, appointment scheduling, electronic identification), protection of minors from inappropriate content with mandatory labeling of programs suitable for different age groups, promotion of national and European cultural heritage, and similar.

In the annual Report of the European Commission for Montenegro for 2022, it was noted that Montenegro remains moderately prepared in the field of digital transformation and media. Limited progress has been made during the reporting period, mostly through alignment with the Directive on reducing the cost of broadband access and adoption of strategic documents on the information society. No progress has been made regarding the previous year's recommendations, and therefore they remain in force. In the coming year, Montenegro should:

- Make progress in aligning with the EU acquis on electronic communications and information technologies, and fully align its legislation on audiovisual media,

²⁶ Strategy for the Development of the Information Society in Montenegro until 2020, with the Public Consultation Report, available at <https://www.gov.me/en/documents/cc172acc-d7a7-4cf0-ba12-e3023ce721b2>

ensuring the operational independence of media regulators and public service media.

- Make progress in granting powers to the Agency for Electronic Media to impose a complete set of measures, including warnings, fines, suspensions, and license revocations, ensuring proportionality and effectiveness.
- Establish results that demonstrate administrative capacity for the implementation of EU regulations on electronic communications, information society services, and particularly audiovisual media services.²⁷

By developing the Smart Specialization Strategy 2019-2024, Montenegro has joined the European Union initiative that emphasizes a new model of economic development at the national or regional level based on targeted support for research and innovation activities. The Smart Specialization Strategy (S3) is a national strategy that establishes development priorities aimed at building competitive advantages through the integration of research and innovation strengths with the needs of the economy, responding in a coherent manner to emerging opportunities and market developments, thus avoiding policy overlaps and fragmentation.

The strategic vision for Montenegro's development is based on increasing the competitiveness of the economy. A developed and competitive economy based on knowledge and resources that need to be valorized through connected priorities of the Smart Specialization Strategy. Furthermore, monitoring and implementation of goals, measures, and initiatives related to the Europe 2020 Strategy, including the national S3, are linked to the key medium-term priority - European Union membership. A modernized and competitive state is based on three key strategic directions:

1. Healthy Montenegro;
2. Sustainable Montenegro;
3. Digitalized Montenegro.

A modernized and digitalized Montenegro should enable the attainment of EU standards. The development and implementation of IT are of paramount importance for economic development. Achieving standards and meeting goals will result in the development of trade, better utilization of capital, and strengthening of national competitiveness. The introduction of modern technologies and the use of available resources in priority sectors will result in the placement of high-quality products in the market. The foundations of this direction relate to improved infrastructure, economy, and information security.

²⁷ European Commission, *Commission Staff Working Document, Montenegro 2022. Report*, link: <https://neighbourhood-enlargement.ec.europa.eu/system/files/2022-10/Montenegro%20Report%202022.pdf>

The Digital Transformation Strategy for 2022-2026 predicts increased coverage and modernization of ICT infrastructure, development and improvement of digital skills, raising awareness among citizens and businesses about the importance of digital development, and improvement of the quality, quantity, and use of e-services. Additionally, digital transformation is expected to contribute to the development of digital awareness and competitiveness of the ICT sector. The direction of "Digitalized Montenegro" is directly linked to all the priorities defined in the Smart Specialization Strategy, and therefore ICT is defined as a horizontal priority sector that provides information technology support to other priority sectors. ICT is the leading sector in Montenegro in terms of output parameters for research, innovation, and development, with a share of around 5% of the total production of ICT in the Western Balkans.²⁸

The development of e-government and digital society largely depends on the normative infrastructure. The specific objectives of legislative regulation consist of creating space for more intensive application of e-business through legal regulation, building public trust in the use and exchange of electronic documents, use of trust services in e-business, and achieving competitiveness in global markets. These laws are equally important for citizens, businesses, public administration, local self-government, and other entities, and their implementation enables progress in international position and action.

The strategic framework for the development of the IT sector in Montenegro is shaped by the Public Administration Reform Strategy for the period 2022-2026, which is complementary to the Digital Transformation Strategy. In terms of service development, public administration reform assumes the digitization of services for citizens, electronic document management, and interoperability of information systems in order to simplify data exchange. In order to achieve the desired transparency of the work of public administration, further development of open data portals and proactive publication of information held by public bodies is planned.

The significance of ICT for societal development is confirmed by sector-specific development programs such as the ICT Judiciary Development Program for 2021-2023. The goal is to ensure continuity and expand the scope of ICT application through the establishment of an integrated judicial information system tailored to the user. This would further strengthen the administrative capacities of the judicial system, increase its efficiency in providing data and services to institutions and citizens. The integrated judicial system is designed to meet the needs and cover the key business processes of the Ministry of Justice, courts, the State Prosecutor's Office, and the Institute for the

²⁸ Source: The Digital Transformation Strategy 2022-2026, available at: <https://www.gov.me/dokumenta/18205a91-1afc-4eb7-a5cb-8ad5bd0b7712>

Execution of Criminal Sanctions. The implementation of this program will ultimately contribute to the creation of an efficient and transparent judicial system through:

- Improvement of the overall environment for the use of information and communication technologies in everyday private and business life
- Enhancement of electronic identification and increased trust in electronic transactions
- Improvement of information security.

Institutional framework for the development of the IT sector in Montenegro

The Ministry of Public Administration is responsible for implementing the policy of a digital society through the development of e-government, e-education, e-health, e-commerce, and other areas. Among other things, the Ministry of Public Administration is responsible for proposing and implementing established policies in the field of establishing and developing an information society; preparing proposals for laws and other regulations in the field of e-government, electronic identification, electronic documents, and information security; developing and implementing strategic-analytical documents in the field of e-government, information society, and digitalization; providing opinions on proposals for laws, strategic documents, and other regulations governing issues related to the development of e-government, e-commerce, and digitalization; digitalization of the operations of state administration bodies through planning, development, and support in the implementation of electronic services; proposing and implementing measures to promote and stimulate research in the field of information society and digitalization.

Within the Ministry of Public Administration, there is the Directorate for Infrastructure, Information Security, Digitalization, and e-Services. The Directorate consists of five departments:

- Department for System Infrastructure, Information and Communication Infrastructure and Information Security
 - Office for System Infrastructure
 - Office for Information and Communication Infrastructure and Information Security
- Department for IT Resource Management
- Department for Standardization of Information Systems and IT Support
- Department for Normativity, Electronic Identification, and Trusted e-Services
- Department for E-Governance
 - Office for Portals and Services
 - Office for Shared Services Development and Data Exchange with Other Systems.

The Ministry of Economic Development and Tourism also deals with relevant tasks in the field of information technology. The Ministry of Economic Development and Tourism, among other things, performs administrative tasks related to: proposing and implementing established policies in the field of establishment and development of telecommunications and postal services; implementing the policy of development and construction of information and communication infrastructure in Montenegro, public access to internet services, management of the internet domain in accordance with international standards; proposing and implementing measures to promote and stimulate research in the field of telecommunications and postal services; monitoring and promoting the development of products and services in the field of information and communication technologies; monitoring and studying the conditions of economic activity and economic position of economic entities in the fields of telecommunications and postal services; proposing measures of current and developmental policy and analyzing their impact on the economic position of economic entities in the fields of telecommunications and postal services; activities related to the development of electronic communications; determining the group of universal service obligations provided by the selected operator; ensuring efficient use of available radio frequency spectrum; proposing measures for the use of telecommunication networks in case of emergency situations and overseeing their implementation, as well as improving the development of competition in the field of electronic communications.

The scope of work of the Ministry of Science and Technological Development is of particular importance, as it designs programs and measures to stimulate innovation in entrepreneurship, provides support to startups and other entities engaged in innovative activities, implements incentive measures for the development of innovation, and regulates this area through the development of laws and bylaws.

According to the provisions of Article 33 of the Law on e-Government ("Official Gazette of Montenegro", No. 72/19), the Government establishes the Council for e-Government for the purpose of monitoring the development of e-Government, proposing measures for improving e-Government, discussing professional issues in the field of information and communication technologies, and coordinating activities related to the development of e-Government. The Council is composed of representatives of bodies and entities whose competences are important for the development of e-Government, as well as prominent experts in the field of information and communication technologies, and a certain number of Council members and the time period for which the Council is established are specified by the same article.²⁹ According to the Decision,

²⁹ Ministry of Public Administration, Digital Society, and Media, Report on the Work of the Council for Electronic Governance for the year 2021, available at: <https://www.gov.me/dokumenta/91092f09-73b4-4446-a7d2-880cd0378f7c>

the tasks of the Council for e-Government are to inform the Government of Montenegro about all significant issues related to the development of e-Government and information and communication technologies; direct, coordinate, and monitor activities related to the development of e-Government among state bodies, bodies of state administration, bodies of local self-government, bodies of local self-government, and other bodies, in accordance with Articles 1 and 2 of the Law on e-Government; discuss professional issues in the field of information and communication technologies related to the development of e-Government; review drafts of regulations, bylaws, strategic, planning, and other documents in the field of e-Government and information and communication technologies, with the aim of digital transformation of Montenegro; initiate amendments to existing legislative regulations in the field of digitization and e-Government; propose measures to harmonize the legislative and administrative framework in order to improve the development of e-Government; work on improving cooperation in the field of e-Government and information and communication technologies among state bodies, bodies of state administration, bodies of local self-government, bodies of local self-government, and other bodies, in accordance with Articles 1 and 2 of the Law on e-Government; work on improving international cooperation in the field of e-Government and information and communication technologies; establish operational and expert working groups as temporary bodies, if necessary; and provide the Government of Montenegro with an annual report on its work.

The importance of the IT sector is best reflected in numerous initiatives in the private sector, whose main goal is to improve the conditions for the development of the IT industry. This applies not only to improving the legal framework and access to financing, but also to the joint efforts of the IT community to develop the necessary digital skills among the population and employees.

ICT Cortex, founded in 2021, is an association that brings together renowned ICT companies and the community in Montenegro, which recognizes the importance and necessity of digital development in Montenegro. The goal of the organization is to create new business opportunities and contribute to the digital transformation of Montenegro at the international level, as well as promote Montenegro as a significant country for IT investments. Enhancing the competitiveness of Montenegro's ICT sector through research and development, collaboration with various stakeholders, and public-private partnerships is the primary mission of the organization.

Taking that into consideration, the ICT Cluster brings added value to its members in the areas of technology, internationalization, innovation, and talent development. ICT Cortex activities are grouped into three categories:

1. Digital transformation - development of information technology and promotion of digital transformation in segments such as research and development, digitization of industry, digitization of economy and public administration, as well as promoting the use of digital tools and services by the population.
2. Education - the goal is to contribute to the improvement of the education system, acquisition of practical knowledge, creation of professional IT personnel and new talents who will have a significant impact in the ICT sector. Numerous trainings, fairs, and internships are organized as part of these activities. Special attention is given to education and empowerment of women in the IT industry.
3. Sustainable innovations - development of innovative ideas that contribute to the development of Montenegro as a modern state recognized for sustainable innovations. Some areas in which contributions have been made include innovations in tourism, smart cities, smart technologies, eco-innovations and sustainable energy, innovative management, etc.

The Montenegrin Chamber of Economy has made a significant contribution to the development of the IT sector in Montenegro. As an independent business, professional, and interest organization, its main goal is to represent and pursue the common interests of its members, i.e., the entire Montenegrin economy. It promotes economic activities based on a free and open market, freedom of entrepreneurship and competition, autonomy of economic entities, and their responsibility for the obligations assumed in legal transactions. The Chamber of Economy is an institutional partner of the Government of Montenegro and cooperates with the Parliament of Montenegro, state administration bodies, and local self-government. It also cooperates with other organizations and institutions in building the economic system, proposing development and current economic policies, and resolving other issues of importance for the economy. Among other things, it initiates the adoption of laws and other regulations in the field of economy in order to improve the business environment, promotes economic potentials and attracts foreign investments through the organization of business forums and participation in fairs, publishes promotional publications and catalogs, presents the economy through the internet and other promotional activities. Furthermore, the Montenegrin Chamber of Economy encourages research, innovation, and development of a knowledge-based economy, innovation, and modern scientific and technological achievements, as well as supports the development of technological infrastructure for the economy and information society. The Chamber has also established a special Association of Information and Communication Technologies, which has 27 members and its primary goal is to promote the development and improvement of the Montenegrin ICT sector.

The American Chamber of Commerce in Montenegro established the Committee for Digital Transformation at the end of 2018 with the intention of promoting digital

development of companies in Montenegro and facilitating the transition to digital business, as well as supporting the public administration in the process of digital transformation. The Committee cooperates with the relevant ministries of the Government of Montenegro responsible for the development of the information society and works on creating favorable conditions for the development of digital technologies and innovation in Montenegro.

The importance of the development and implementation of information and communication technologies in the transition to the digital economy, strengthening national competitiveness, and overall economic progress has been recognized by the Association of Managers of Montenegro. The Association aims to achieve synergy of knowledge and experience through the gathering of people working in managerial positions, enable practical education, and promote good management. Within the Association, a Committee for Digital Transformation has been formed. Operating under the auspices of the Association of Managers, the Committee carries out a series of activities aimed at promoting the development of established ways of thinking and doing business, as well as recognizing, adopting, and facilitating the intensive use of digital technologies by a large number of Montenegrin economic entities. Therefore, the Committee highlights as its primary mission the evolutionary change in the way of doing business and the transition of Montenegrin companies from established ways of doing business to digital business by accepting digital transformation.

In accordance with the decision of the Board of Directors of the Employers' Union of Montenegro (UPCG), the UPCG Committee for Digital Transformation has been formed, focusing on activities aimed at supporting and promoting digital business and the development of an innovative economy to accelerate the processes that lead to the development of the digital economy and the construction of Montenegro as a digital society. Through planned activities, the Committee for Digital Transformation will support the business community in responding to the challenges posed by technological innovations (including automation and digitization), including the development of IT awareness, knowledge, and skills that can facilitate the implementation of advanced ICT solutions in all sectors of the economy, and thus promote further development of entrepreneurship and digital society in Montenegro. A proactive approach to new and innovative technologies that will enable ICT to grow into a vertical branch of the economy will be one of the important goals to which the Committee members will be particularly dedicated. Confirmation of this is the fact that the development of an entrepreneurial and innovative ecosystem based on digital transformation improves conditions for new digital business models, accelerates the development of new products and services, expands digital networks of suppliers and

business partners, and thus enables domestic companies to gain competitive advantage and better positioning, as well as easier access to new global markets. Part of the institutional support for the development of the IT sector in Montenegro also includes initiatives of individual companies that offer education for current and future employees in the IT sector in Montenegro. Among them, Amplitudo and Logate stand out, in addition to ICT Cortex. Amplitudo started operating in 2018. The Amplitudo Academy educates and professionally develops young people in the fields of programming, marketing, design, and project management. The Academy was established with the aim of providing all interested individuals with the opportunity to gain practical knowledge through free training and be competitive in the market. By assessing and analyzing the market needs, the Amplitudo Academy plans upcoming trainings with the aim of making them as professional and practical as possible so that candidates have the opportunity for employment upon successful completion. Logate Academy is a licensed institution for adult education in Montenegro, offering specialized knowledge in the field of information technology through various courses and training programs. The Logate team of experts has hundreds of years of collective experience in the development, implementation, and support of enterprise software solutions. The Academy aims to empower the IT community in Montenegro through a growing offering of professional and accredited IT training, educate IT professionals, and promote careers in the IT industry as challenging, interesting, and in-demand in the job market.

Chances and Limitations for the Development of the Montenegrin IT Sector

In order to achieve the strategic goal of "Digitally Transformed Montenegro," a developed ICT, i.e., IT sector, is essential. A developed IT sector directly determines the innovative capacity of the country. Quality IT professionals, an education system aligned with modern IT trends, digitally aware leaders in the public and private sectors, and the development of innovative solutions are crucial for its development. These are the links that make up the chain that drives the wheel of economic and social progress through the process of digital transformation.

The development of the IT sector, both qualitatively and quantitatively, is most influenced by the level of demand for information society services from the public sector, education, economy, and healthcare, as well as the readiness of the sector itself to respond to the increasing challenges that come with modern technological trends and the concept of Industry 4.0. Industry 4.0 involves the complete digitization of all production processes and the application of digital technologies in creating product ideas, product engineering, production organization, production realization, process

control, and provision of industrial services. Key elements in the implementation of the concept of Industry 4.0 are IoT (Internet of Things), robotics, cloud computing, cyber-physical systems, and big data.

Based on a review of available literature and research on the current and potential impact of ICT on the development of Montenegro conducted by IPSOS³⁰ in Montenegro in 2018 for the UNDP (United Nations Development Programme) (hereinafter referred to as IPSOS research), as well as based on conducted in-depth interviews and organized focus groups, the following overview of limitations and opportunities for the development of the Montenegrin IT sector is provided.

Chances for the Development of the Montenegrin IT Sector

The prerequisite for the advancement of the IT sector in Montenegro relates to creating conditions for various organizations and information systems to collaborate and exchange information. This includes establishing efficient cooperation among all public administration stakeholders and automating the exchange process while ensuring high-quality integration of processes at all levels.

There are two levels of information and data exchange recognized in the process: public and closed. Public exchange is carried out through the Open Data portal, while closed data exchange is done through the Unified System for Electronic Data Exchange (JSERP).

Digitized public administration implies that government bodies use data that other government bodies have already collected from individuals and businesses, instead of asking for the same data multiple times. Similarly, citizens and businesses should not have to collect information from one government body just to submit it to another government body. Although this information exchange between bodies is legally provided for, it does not happen in practice, and therefore it is necessary to standardize and systematize digital databases/registries and data exchange between them. As acknowledged in the Public Administration Reform Strategy, it is important for all ministries and other state bodies to connect with JSERP, which will require support and guidance from the body responsible for JSERP, as well as the implementation of targeted measures to motivate ministries and bodies to publish and interlink registers in accordance with legal obligations.³¹

³⁰ The field research included: i) a survey on the general population, ii) a survey with representatives of companies as users of digital technologies, iii) a survey with representatives of the IT sector in Montenegro and in the region - Serbia, Croatia, and North Macedonia, and iv) a survey with representatives of the academic community, business associations, and government institutions.

³¹ Government of Montenegro, Public Administration Reform Strategy 2022-2026,

Timely access to high-quality data in a readable format is also a necessary precondition for making better business decisions. In order for businesses, organizations, and individuals in Montenegro to make informed decisions, they need reliable data from government sources. Improved access to high-quality data can help businesses and communities make better decisions, while creating new opportunities for Montenegro to grow and progress, which is certainly the ultimate goal. By creating a list of technical interoperability standards, establishing new functionalities, and developing guidelines or guides for institutions as providers and/or users of JSERP services, along with conducting workshops for the full implementation of the Law on Administrative Procedure based on the principle of conducting administrative activities, conditions will be created for institutions to fulfill their obligations of collecting documentation ex officio in an electronic, fast, and reliable manner in one place.

³²

One of the basic and essential prerequisites for the process of digitalization is the increase in broadband access coverage for the population (both fixed and mobile). Specifically, the expansion of availability of fixed broadband access with speeds of 100Mbps+ and the introduction and wider adoption of 5G services are key factors for accelerated and quality progress towards the goals outlined in the EU document European Gigabit Society 2025.

Necessary assumptions for this process include alignment and adoption of appropriate legislation in line with EU regulations, as well as preparation and subsequent implementation of a National Broadband Network Expansion Plan. Additionally, modernization and improvement of infrastructure in key state institutions through increased capacity and encryption of communication between these institutions, in accordance with all relevant standards, is an essential element, as data security and availability are binding factors in any digital society.

The development and enhancement of digital skills and knowledge among all segments of the population is a prerequisite for the digital transformation of a society. The development of e-services is effective only if citizens have a sufficient level of digital skills and knowledge to use these services. The digitization of business processes in public administration is possible only if officials have the appropriate level of digital skills and knowledge to carry out processes electronically (processing of electronic documents, handling requests submitted through electronic services, etc.). The IT workforce also plays a crucial role and needs to be regularly educated and updated on technological changes that occur with the development of technology.³³

³² Ministry of Public Administration, Digital Society, and Media, [Strategija-digitalne-transformacije-Crne-Gore-2022-2026-sa-Akcionim-planom.pdf \(s3.me\)](#)

³³ *ibid*

Lack of awareness among citizens about e-services is one of the important issues. Therefore, in order to create holistic and sustainable solutions in the field of digitalization, continuous activities aimed at raising citizens' awareness about the importance and benefits of digitalization, especially in the domain of using e-services designed to meet citizens' needs, need to be implemented in close collaboration with various stakeholders (business community, civil society, etc.), which would also impact their motivation to contribute to meaningful digitization efforts.

In order to create a better user experience, it is necessary to improve the national eID scheme and develop new eID systems and mechanisms through targeted activities. It is especially important to enhance the electronic identification system using mobile technologies. In order for electronic services of public administration to cover all types of administrative procedures, it is necessary for users to be able to identify themselves securely. This process requires the development of concepts and tools for digital identity.

Representatives of the IT sector believe that the telecommunications infrastructure in Montenegro is well-developed, particularly regarding the presence of 5G networks, which is only found in Croatia within the region.

Limitations for the development of Montenegrin IT sector

Analyzing the technologies within which they offer their services, IPSOS research concludes that the domestic IT sector is poorly developed. According to IPSOS research, representatives of public administration, academic community, business associations, and the IT sector agree that digitalization of business is currently a priority factor for economic growth, while, on the other hand, there is consensus among them that digitalization of the economy in Montenegro is largely at a low level. Technologies that are the foundation of Industry 4.0 and digital transformation, such as Cloud computing, Big Data, IoT (Internet of Things), AI (Artificial Intelligence), ML (Machine Learning), VR and AR (Virtual Reality and Augmented Reality), blockchain, are still minimally represented. There is a lack of experts in these areas, and therefore projects based on modern technologies are also lacking. The domestic IT sector mainly provides services for the digitalization of individual business processes, with a focus on digital marketing. However, recently there has been a noticeable shift towards modern technologies, which primarily requires the improvement of digital competencies of both IT professionals and end users.

The assessments of representatives of companies about the state of digital skills of their employees confirm the general views on the issue of digital literacy in the labor market.

I wouldn't say that we are not digitally literate, because even before they can speak, children literally know how to navigate a phone. The user interface is designed so intuitively that it doesn't require extensive knowledge, coding, etc. to use it. Digital literacy in terms of general familiarity with technology and devices does exist, but there is a barrier and fear of change. Montenegro issues and recognizes digital signatures, but we are still stuck in the old, comfortable system that we know, and we find it very difficult to accept changes. - Discussion in a focus group with representatives of institutions supporting the development of the IT sector in Montenegro.

Only slightly over a third of the surveyed companies (35%) assessed that employees working in jobs where digital skills are required have a sufficiently high level of skills to fully and efficiently perform their job, while in 19% of companies, the digital literacy of employees was rated as very good. IPSOS research indicates that the reasons for this state of affairs are:

Lack of awareness among business owners about the importance of digitalization. There is still a lack of complete understanding among business owners about the benefits that digitalization brings. In many cases, especially among small businesses, investments in information and communication technologies are still seen as an additional cost rather than an investment for improving business operations.

We don't need expensive digital technologies, services, and software that require investment in order to bring efficiency. There are so many of them that are free and easily accessible. The key is to be aware that without them, there is no survival. The question is whether we are aware of the need for adaptation or if it will be imposed on us by a new crisis, globalization. - Discussion in a focus group with representatives of institutions supporting the development of the IT sector in Montenegro.

Financial reasons - digitalization requires investments that companies, especially small ones, are not ready for.³⁴

The major barrier to the improvement of the IT sector, including the concept of e-commerce and other sectors, particularly their internationalization through the ability to deliver goods and services online, is the lack of credible payment processors (e.g. PayPal). Payment transactions can still only be conducted one way, from Montenegro to other countries. The absence of globally recognized payment processors for Montenegro sends a negative image to potential clients and investors, serving as confirmation of lack of trust in the country and its institutions.

One of the leading problems faced by employers in the IT sector, which becomes more pronounced every year, is the lack of skilled workforce. This problem is somewhat

³⁴ Ministry of Public Administration, Digital Society, and Media, Strategy for Digital Transformation of Montenegro 2022-2026, available at <https://s3.me/wp-content/uploads/2022/06/Strategija-digitalne-transformacije-Crne-Gore-2022-2026-sa-Akcionim-planom.pdf>

addressed through organizing courses for various digital skills. However, in order to achieve the desired quality, with a focus on organizing and attending courses for improving specific knowledge and skills, basic knowledge needs to be systematically acquired by participants in higher education institutions.

The question arises whether the problem lies in the lack of workforce in the market or in how that workforce is distributed in the market. The fact is that young people who are graduating from college find it more interesting to work as freelancers from home, to have the opportunity to work remotely for much more competitive and better-paying positions than those offered by corporations and the overall job market in Montenegro. The market always seeks professionals in this field because, as we are all aware, the ICT sector has advanced significantly in recent years, opening up numerous career paths in that field. - Discussion in a focus group with representatives of educational institutions in Montenegro.

There is an increasing shortage of systems engineers who possess the knowledge and competencies to design, develop, and implement sophisticated information systems and other services and products that the advanced IT sector should deliver to end users. Therefore, additional reforms are expected in the education sector to align the process of knowledge and skills acquisition with the new jobs that Industry 4.0 is opening.

Academies such as Logate, ICT Cortex, Amplituda, etc., provide knowledge precisely because they are created by companies operating in the sector. They offer more concrete, acceptable, and faster ways to prepare young people for the job market, simplifying the process while maintaining quality. The main problem, as well as a recommendation, lies in the role of employers in this field in shaping educational policies. In the coming period, it is crucial to strengthen this role by actively working on enhancing the connection between the economy and the education system in terms of curriculum development in schools and universities, as well as promoting ICT professions. - Representative of an institution supporting the development of the IT sector.

It is clear that with the level of technological advancement today, even in the presence of well-established higher education institutions, the concept of lifelong learning needs to be embraced, especially in the field of information and communication technologies. This requires close collaboration among policymakers, academia, and the business community.

We have students who enroll in university and show great interest. However, we encounter a problem by the third year when students reach a certain level of knowledge and skills. At that point, books and academic advancement, in terms of building an academic career and working in universities, lose their appeal. They are attracted to salaries that are much higher than any salary in the education sector, ranging from

elementary to the highest level, and simply lack motivation. Our university has a lot of collaboration with the academic and ICT community in Montenegro, and we strive to keep up with the trends. - Discussion in a focus group with representatives of educational institutions in Montenegro.

There is a noticeable and significant gender gap in employment between men and women in the ICT industry. According to data from Monstat for the year 2021, the total number of employees in the field of information and communication is 6239, of which 2611 are women.³⁵ A potentially important reason for the relatively small number of women in technology is gender stereotypes, or the belief that jobs within information technology are primarily for men. Although the number of women in the IT world has increased in recent years, it is still a predominantly male-dominated sector.

As of December 2022, the number of unemployed in the telecommunications sector was 292, of which 215 were men and 77 were women. The largest number of unemployed, around 83%, or 174 men and 69 women, have completed the IV degree of secondary general and vocational education.³⁶ This data structure raises questions about the quality of education considering that the majority of individuals with secondary education in the field of telecommunications do not meet the market demands.

The research conducted by ZZZCG on the shortage of occupations in 2021 confirmed that the missing occupations are IT specialists and information system programmers, especially in the central part of the country. Furthermore, the review of permits issued for temporary residence and work for foreigners by activities in 2021 confirms the exhaustion of quotas at the level of 72% in the J sector. Namely, out of the total quota of 530 permits for employing foreigners and additional 20 permits for seasonal employment of foreigners, a total of 396 permits were used during 2021, out of which 3 were related to seasonal employment of foreigners in sector J.³⁷

The need for further investment in strengthening resources, expertise, and continuous progress in the area of proactive cyber actions in Montenegro has been recognized. In many countries and international organizations such as the North Atlantic Treaty Organization (NATO) and the European Union (EU), cyber security is one of the main priorities, and this issue is defined in corresponding cyber security strategies and concepts. However, the limitation of the legal framework in this area causes difficulties in implementing procedures. Specifically, it remains a challenge to classify cyber attacks against a state as digital "armed attacks". As a result, adequate international

³⁵ Montstat, Statistical Yearbook 2022, available at <http://www.monstat.org/uploads/files/publikacije/godisnjak%202022/5.pdf>

³⁶ Source: Employment Agency of Montenegro

³⁷ Source: Employment Agency of Montenegro, Survey on Deficit Occupatuions i 2021, December 2022, available at <https://www.zzzcg.me/wp-content/uploads/2023/02/Istraživanje-Deficitarna-zanimanja-u-Crnoj-Gori-u-2021.-godini.pdf>

cooperation is lacking, and the role of international organizations is also very limited.³⁸ Inadequate communication and collaboration between the public and private sectors largely contribute to the lack of trust among citizens in institutions and companies involved in electronic business. On the other hand, insufficient digital literacy among end users and neglect of good practices in device usage for communication present a special challenge. The reason for the aforementioned problem is the lack of awareness among the population about cyber security in general.

Following best security practices, one of the challenges is also the clear separation of functions of administration and management of information systems from the function of managing the security of these systems. In cases of limited human resources, functions of security and administration overlap in some institutions. This fact directly leads to a reduction in the level of system security because there is no secondary control over administrators, as they themselves perform the security function of their institution.³⁹

The IPSOS survey (2018) also examined the development of the IT sector in the countries of the region (Montenegro, Croatia, Serbia, and Macedonia) and confirmed a high degree of similarity among the attitudes of IT sector representatives in these countries. The majority believe that the Croatian IT sector is the most competitive at the regional level, while the state of the IT sector in Montenegro is generally perceived as poor, and worse compared to the state of the IT sector in other countries. The perception of representatives of the Montenegrin IT sector largely aligns with the views of IT sector representatives in the region. In particular, it is noted that the Montenegrin IT sector is currently in a slightly worse position compared to the IT sectors in Croatia and Serbia, as the overall profit generated within this sector, its annual growth, and contribution to the economy are smaller than in Croatia and Serbia. Also, most representatives of the Montenegrin IT sector agree that the state of the IT sector in Montenegro and Macedonia is similar to each other.

In the responses provided by representatives of the Montenegrin IT sector, faculties, and business associations, the following indicators of the poorer state of the IT sector in Montenegro compared to Serbia and Croatia were highlighted: lower total number of employees in the IT industry and IT professionals per capita; lower salaries for IT professionals; fewer domestic software companies focused on production and fewer companies exporting software; fewer foreign companies opening software development and information system development firms; limited diversity of technologies and

³⁸ Source: Government of Montenegro , MOnTenegrin Cyber Security Strategy 2018-2021, available at <https://wapi.gov.me/download-preview/fa24a8c6-2241-4d6f-9297-328636b157e5?version=1.0>

³⁹ *ibid*

software tools that IT companies engage in/offer, as well as lack of innovative technologies; underdevelopment of startup businesses and fewer formed startups and innovative companies; limited availability of various resources such as hubs, accelerators, and different forms of support for alternative forms of business in this field (startups, freelancing).

When it comes to the reasons why the IT industry in Montenegro lags behind other countries in the region, representatives of the Montenegrin IT sector identify the following as the most important factors:

1. The size of the Montenegrin market, as well as a number of other factors that are more or less related to it. All representatives of the Montenegrin IT sector point out that the problem is that Montenegro, as the country with the smallest population in the region, has a relatively small market compared to Croatia and Serbia. This aspect makes Montenegro less attractive to foreign investors and, to some extent, limits the development of domestic IT companies. The size of the market further determines a number of other factors that limit the development of the IT sector, such as the availability of large IT projects and the level of digitalization of systems in various sectors.
2. Market structure. IT companies in Montenegro traditionally target the majority of their services and products to the national market, where the largest client is the state, while a smaller portion consists of users from the real sector.
3. Level of government investments in the IT sector, which is considered among the lowest in the region and significantly below the average in the European Union. They believe that the funds allocated from the Montenegrin state budget for research and development in this area are insufficient for stimulating research and development in this field.

In addition to the mentioned reasons, other factors cited include: lower level of digitization in the economy and a small number of domestic entities in the business sector that are able to allocate funds for the development and implementation of IT solutions; inadequacy and obsolescence of educational programs, and insufficient training of graduates from ICT-related faculties; lack of networking among IT sector stakeholders, partially addressed by the establishment of the ICT Cortex association; and absence of well-defined strategies and state incentive policies focused on the development of this sector.

Representatives of the Montenegrin IT community argue that state authorities are inefficient in implementing certain laws and sub-legal categories in the field of IT. Consequently, according to their opinion, even good legislative solutions are not fully utilized.

The cyber attack that occurred during the summer months of 2022 and the response of the public administration have resulted in a decline in trust in policy makers.

The primary issue with cyber attacks is not the lack of knowledge among IT professionals but rather the lack of knowledge and preparedness among non-IT individuals. Prevention is crucial; waiting for an attack to happen before seeking solutions is inadequate. It is necessary to educate people to minimize risks. The cyber attack has significantly set back progress, as individuals who were previously undecided about conducting electronic transactions now perceive paper-based methods as more secure. - Discussion in the focus group with representatives of institutions supporting the development of the IT sector in Montenegro.

The war in Ukraine and population migrations have also influenced the dynamics of the IT sector. During discussions in focus groups, it was observed that there has been an increased number of registered IT companies founded by individuals from Ukraine and Russia. According to participants, these trends contribute to the creation of unfair competition for the domestic IT sector.

It's not just about globalization or the race we are losing on the global market; it's also about foreign companies that have been established here. These companies have created unfair competition in Montenegro and have taken away the workforce that we have been developing for years. The Law on Digital Transformation that we created was adequate, but its implementation has been completely lacking. We can only observe those experts, who could potentially be part of the IT community in Montenegro, in terms of how much money they spend in shopping centers like Voli, rather than contributing to the IT sector. - Discussion in the focus group with representatives of institutions supporting the development of the IT sector in Montenegro.

Further integration and organization of the IT sector are needed to enhance collaboration with public administration, not necessarily for financial support from the government, but primarily to improve regulations.

Improving the competitiveness of the domestic IT sector is crucial, as indicated by the relatively low number of registered startups and the fact that those with potential for success choose to register in other jurisdictions, such as Estonia.

We are not competitive in the global market. In Montenegro, we only have a few startups, small rapidly-growing innovative companies that have emerged in the last 3-4 years, and they need to find their position in the international market. The speed of the global market will "devour" us because we are still playing a game of telephone, especially with the emergence of artificial intelligence, which will largely replace developer positions and many others in the next iteration. Montenegro is lagging behind, and whenever someone tries to accelerate, the system pulls them back. - Discussion in the focus group with representatives of institutions supporting the development of the IT sector in Montenegro.

The slow pace of digitalization has been identified as a constraint on the development of the IT sector. Representatives of the IT community who participated in the focus groups believe that the state of Montenegro is reluctant to embrace digitalization. Despite discussions and significant investments over the years, the digitalization process is progressing slowly. Furthermore, technologies are advancing rapidly, making implemented digital processes outdated by the time they are fully operational.

It seems like the government of Montenegro doesn't want to embrace digitalization. There has been talk about it for years, and a lot of money has been invested, but the process is very slow. Digitalization implies reducing the number of jobs in certain services, but instead of decreasing, the workforce seems to be increasing, as if there is a deliberate delay in entering into digitalization of specific processes. And not only that, technologies are rapidly evolving in the meantime, so by the time you implement a specific digitalized process, it's already outdated - IT sector representative.

All of these problems, ranging from workforce education to the slow pace of digitalization, could be addressed more effectively if the state fully supports digitalization. Once this occurs, more projects will emerge, creating a demand for skilled professionals. With a well-trained workforce, specialized knowledge, and access to foreign markets, the domestic IT sector can overcome the challenges it currently faces - IT sector representative.

Existing services are often only partially electronic. Even in situations where regulations recognize digital signatures, "if the judicial system does not recognize them, the effects for the economy are small," as illustrated by an example given by one of the participants in a focus group with representatives of institutions supporting the development of the IT sector in Montenegro.

We conducted an ad-hoc analysis that shows that we lose 20 million euros annually due to several documents that we handle manually, only in the field of public procurement. The state and all of us are losing a lot. In the field of education, we have a similar story. We have an HR surplus in the IT field, and at one point, we had 300 people from the IT field registered with the employment agency. We organized a mini fair (two years ago) and invited a sample of 300 people, of which 80 responded, in collaboration with the Employment Agency. The companies that reported the need for 2-10 new people didn't hire anyone because we have a large number of IT professionals with postgraduate degrees, as well as those who do not want to register because they work in the informal sector, etc. - representative of an institution supporting the development of the IT sector. The opinion of representatives of the IT industry is that investments in the IT sector are relatively small, and for larger investments, it is necessary to ensure political stability and predictability of the economic and overall institutional system.

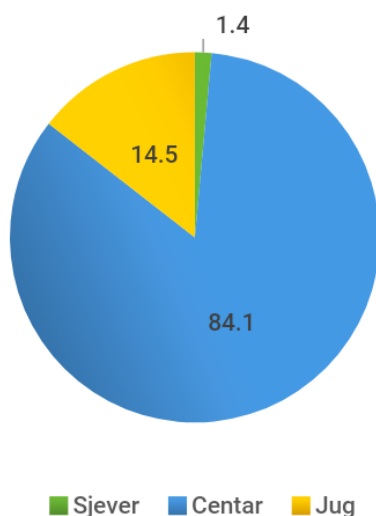
The results of the research among IT companies

In order to gain a deeper understanding of the environment in which the IT sector is developing, especially considering the limited availability of statistical data, a research study was designed and conducted among companies primarily engaged in information technology. Data on the structure of the IT subsector based on industry codes, as previously explained, were used to create the sample. Contact was made with member companies of ICT Cortex, as well as other companies registered under an industry code that belongs to the IT subsector, whose contacts were available in CRPS and BInfo applications. In addition, companies that were recognized as providers of IT services, but registered under a different industry code (e.g. advertising agency or consulting activities related to business and other management), were also contacted. The only additional condition taken into account was that the surveyed company was established before 2022. A total of 70 companies were surveyed, of which 80% were registered under an industry code related to the IT sector. The following is an analysis of the research results and interpretation of the collected data.

Profile of IT companies

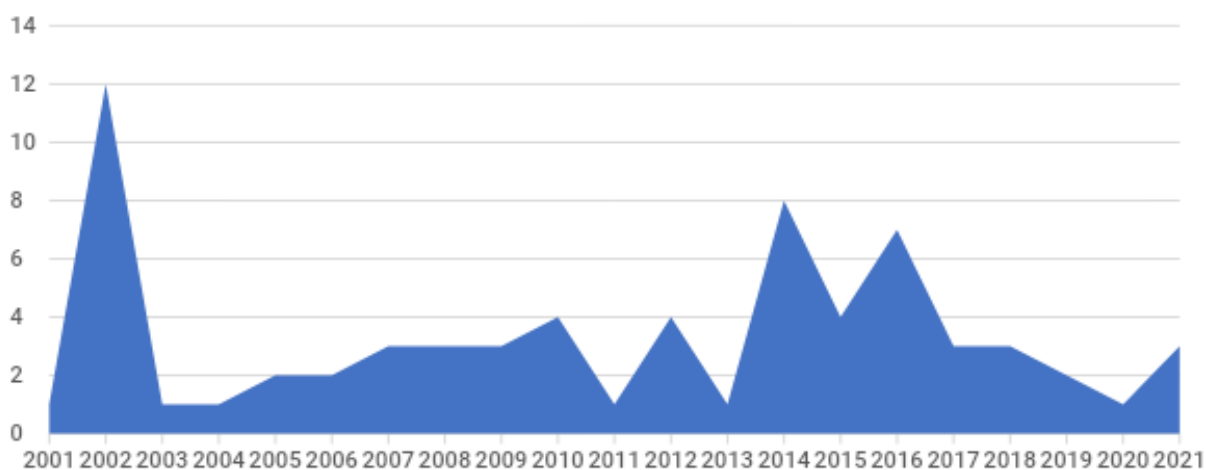
A quantitative research study surveyed 70 companies, the majority of which are headquartered in municipalities in the central region (84.1%), while 14.5% of the companies are registered in the southern region and 1.4% in the northern region.

Graph 11. Headquarters of the company, in % (n=70)



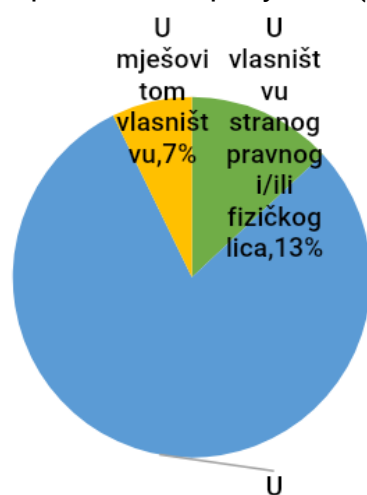
The companies that participated in the research were established between 2001 and 2021, with the establishment dynamics shown in Figure 10. The longest operating companies are 24.6% of those established between 2001 and 2005, while 21.7% were established between 2006 and 2010. 26.1% of the companies were established between 2011 and 2015, while 23.2% were established between 2016 and 2020. The remaining 4.4% are companies that started their operations in 2021. The average age of the surveyed IT companies is 12.2 years.

Graph 12. Year of establishment of the company, in % (n=70)



In terms of ownership, 79.7% of the companies are owned by domestic legal entities and/or individuals. Among the surveyed companies, 13% are owned by foreign entities, and 7.2% have mixed ownership.

Graph 13. Ownership of the company, in % (n=70)

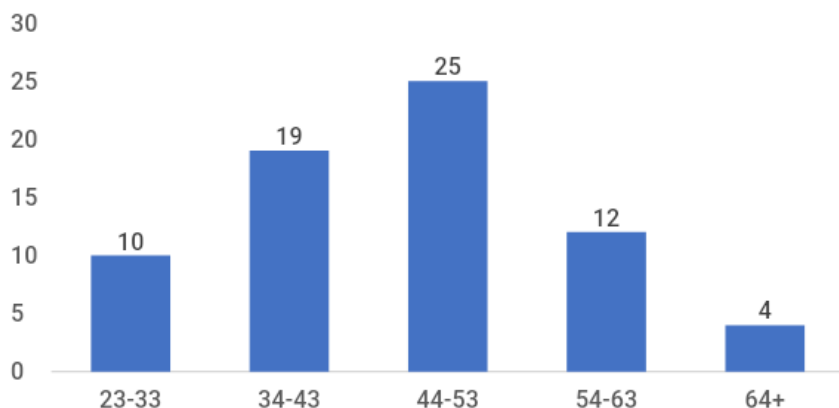


When it comes to foreign capital, the largest percentage (38.1%) originates from countries in the Western Balkans. The rest of the capital comes from countries such as

Croatia, Slovenia, Slovakia, Italy, Cyprus, Greece, Russia, Scotland, Ireland, Turkey, Ukraine, and the United Kingdom.

In cases where the founders are individuals, males dominate, accounting for 76.9% of the cases. Males also dominate in terms of the gender structure of executive directors, holding such positions in 73.9% of the cases. The majority of executive directors are between the ages of 44 and 53, with an average age of 45.7 years.

Graph 14. Age of the CEO/Managing Director, in % (n=70)



The average number of employees per company is 22.

Males dominate among the employees, accounting for 65.8%, while females make up 34.2% of the workforce. When it comes to the type of employment contract, according to the responses of the surveyed companies, 71.8% have permanent contracts, while 28.2% of employees have fixed-term contracts. Permanent contracts are more common among females (75.2%) compared to male employees (70.0%).

For 44.3% of the companies, the dominant activity is computer programming (code 6201). Consultancy activities in the field of information technology (code 6202) are the main activity of 17.1% of the surveyed companies, while 14.3% are engaged in other services in the field of information technology.

Table 3. Industry sectors of the companies, in % (n=70)

Industry	%
6201 – Computer programming	44,3
6202 – IT consultancy activities	17,1
6209 – Other IT services	14,3
6311 – Data processing, hosting	2,8
6312 – Web portals	1,4
Other activities (business consultancy, advertising agency activities, etc.)	20,1

The surveyed companies in the IT sector, according to the activity code, employ a total of 833 employees, which represents 30% of the total number of employees in the IT sector. The average number of employees in these companies is 14.9.

Business results

The majority of companies (41.4%) stated that the largest portion of their revenue is generated from the development and marketing of their own IT solutions (software or mobile and web applications). One-fourth of the surveyed companies (25.7%) generate the most revenue from software development for others, also known as "outsourcing", while sales and distribution of computer products account for the largest portion of revenue for 10% of the surveyed companies.

Table 4. Key revenue-generating activity of the company, in % (n=70)

Key revenue-generating activity of the company, in %	%
Development and commercialization of proprietary IT solutions (software or mobile and web applications)	41,4
Software development for others, also known as 'outsourcing'	25,7
Sales and distribution of computer products	10,0
Creation and distribution of digital content	9,9
Design and 3D modeling	2,9
Other activities	10,1

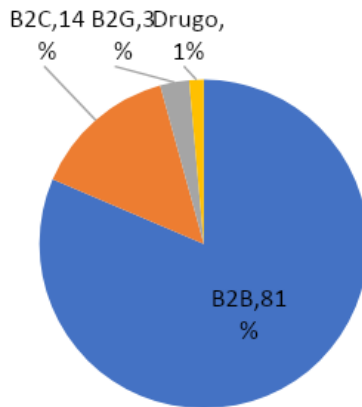
When looking at the industries, it can be concluded that the development and marketing of their own IT solutions (software or mobile and web applications) and software development for others, also known as "outsourcing", dominate as the primary and additional activities of the companies.

Table 5. Additional activities of the companies, in % (n=70)

Additional activities	%
Software development for others, also known as 'outsourcing'	31,4
Development and commercialization of proprietary IT solutions (software or mobile and web applications)	22,9
Commercial training/education	22,9
Creation and distribution of digital content	17,1
Equipment sales	17,1
Digital advertising	11,4
Repairs	10,0
Sales and distribution of computer products	8,6
Design and 3D modeling	7,1
Other activities	8,5

The dominant business model among the surveyed companies is Business-to-Business (B2B), accounting for 81.4% of the companies. A smaller portion of the companies uses Business-to-Consumer (B2C) as their primary model, accounting for 14.3%, while the Business-to-Government (B2G) model is the least represented at 2.9%.

Graph 15. Dominant business model, in % (n=70)

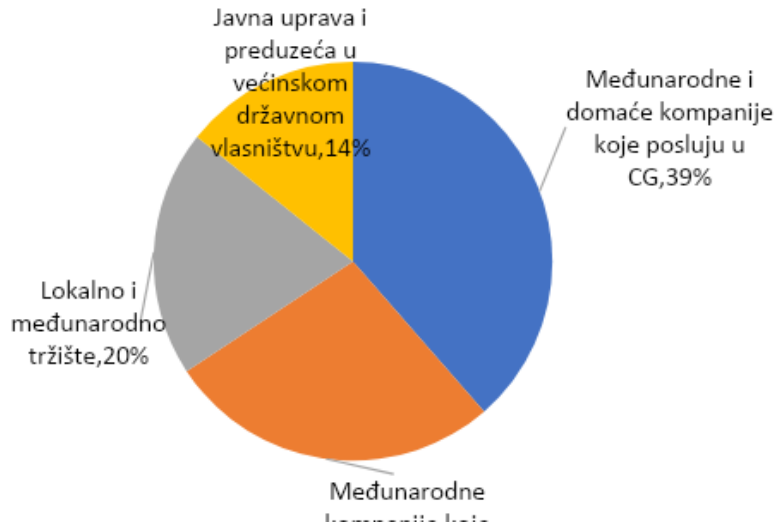


According to the survey, the surveyed companies had a total revenue of 94.3 million euros in 2021. Out of the 70 companies, 11 of them, or 15.7%, reported operating at a loss in 2021. The remaining 84.3% reported an average net profit margin of 17%.

Based on the responses, the average share of revenue from IT services in the total revenue of the companies is 82.5%.

As for the primary market, 38.6% of the surveyed companies reported that their primary clients are international and domestic companies operating in Montenegro. For 27.1% of the companies, their primary clients are international companies outside of Montenegro. Local and international markets are primary for 20% of the companies, while 14.3% of the companies primarily collaborate with public administration and state-owned enterprises.

Graph 13. Primary market of companies, in % (n=70)



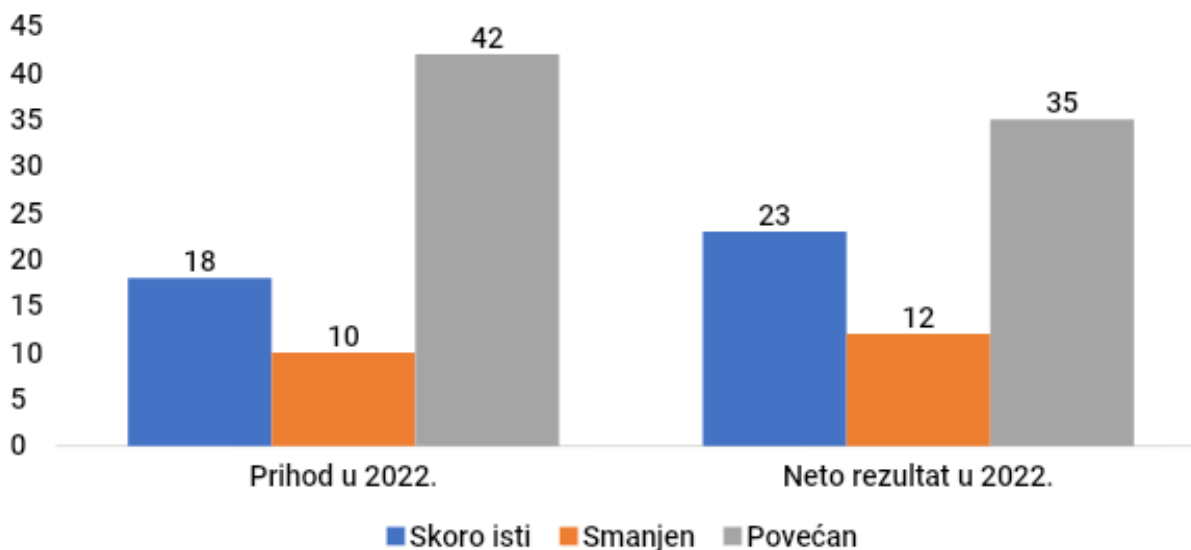
From 2018 to 2022, 65.7% of companies generated their highest revenues from business operations in Montenegro. The second most common primary market was the United States, accounting for 21.9% of companies, while 11.4% identified the European Union as their primary market during the observed period. Despite significant capital investment from Serbia, only two companies listed it as their primary market for export services in the past four years. Two companies also mentioned the United Kingdom as their primary market, while one company each listed Asia, Southeast Europe, Germany, and Croatia. On average, 81.7% of a company's total revenues are generated in their primary market.

Out of the 70 surveyed companies, 22 companies, or 31.4%, do not engage in export activities. Just over 27% of the surveyed companies generate 80% or more of their revenues from exports. Export revenues account for 49.8% of total revenues for companies engaged in export activities.

Comparing 2022 revenues to 2021, 60% of companies reported an increase in revenues, while 25.7% reported no change. 14.3% of companies reported a decrease in revenues in 2022 compared to the previous year.

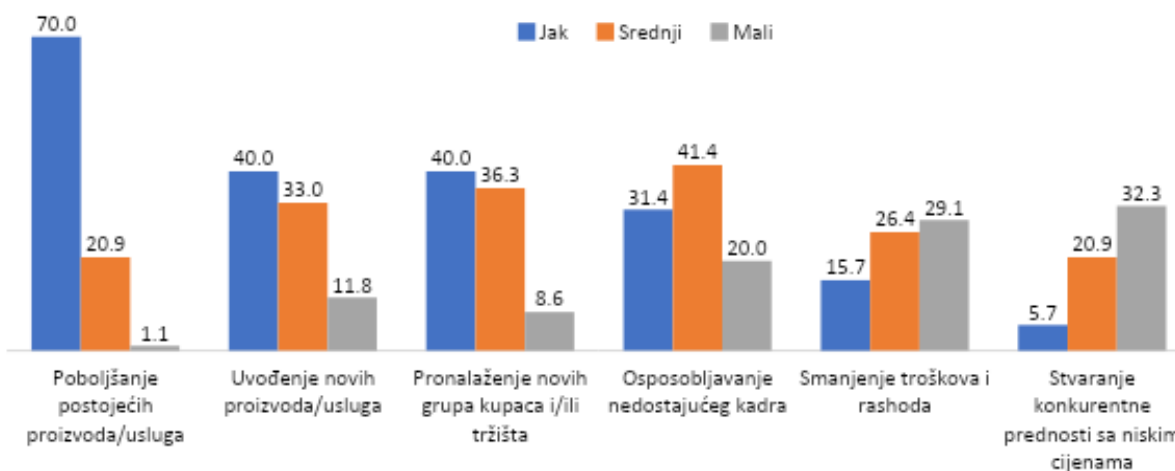
Regarding net results in 2022, half of the companies experienced an increase. 32.9% reported the same net result as in 2021, while the remaining 17.1% of companies recorded a decrease in net result at the end of 2022.

Graph 17. Net revenue result achieved in 2022 compared to 2021, in % (n=70)



During the same period (2018-2022), companies implemented various strategies to strengthen their competitiveness. According to their responses, the highest focus was on improving existing products and services, with 70% of surveyed companies prioritizing this area. Meanwhile, 40% of companies focused on introducing new products/services and identifying new target customer groups and/or markets. The least attention was given to creating competitive advantage through low prices.

Graph 18. Significance of strategies for companies in the period 2018-2022, in %. (n=70)



Review of the business environment

The overall rating for the IT sector development ecosystem in Montenegro, as rated by surveyed companies on a scale from 1 to 10, is 5.19, which is slightly above average. When it comes to satisfaction with individual elements of the ecosystem, the highest

rating of 5.8 is given to the availability of advanced technological infrastructure, including fast internet connectivity, cloud computing, and high-quality hardware resources. The availability of educated and talented programmers and IT experts, as well as the presence of developed IT companies and an active startup scene, received a rating of 4.4 on the scale from 1 to 10. The lowest rating of 3.5 on the scale from 1 to 10 was given to the financial environment, including the lack of investments in IT companies.

Table 6. Satisfaction level with individual elements of the IT sector development ecosystem in Montenegro, on a scale of 1 to 10, in % (n=70)

It sector development ecosystem elements	Ocjena od 1 do 10
Availability of advanced technological infrastructure, including fast internet connection, cloud computing, and high-quality hardware resources	5,8
Availability of educated and talented programmers and IT technology experts	4,4
Presence of developed IT companies and active startup scene	4,4
Government support through creating policies and regulations that foster growth and development	4,2
Overall culture of innovation and technological development	4,1
Favorable financial environment, including significant investments in IT companies	3,5

For over half of the companies (54.3%), limited availability of suitable new talent is one of the most important factors hindering the growth and development of the IT sector in Montenegro. A significant number of them, 48.6%, face limited demand in the local market. Rising labor costs are a limitation for 28.6% of the companies, while unfair competition, such as price dumping, is a challenge for 24.3% of the companies.

Table 7. The most important factors limiting the growth and development of the IT sector in Montenegro, possible 3 answers

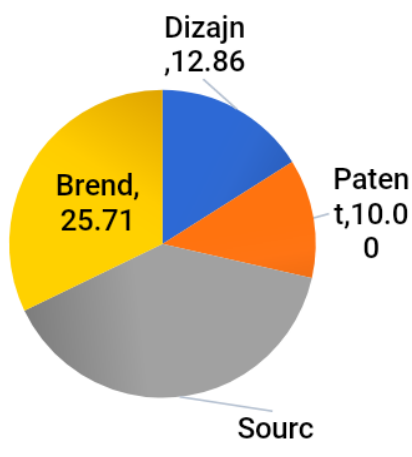
The most important limiting factors	%
Limited availability of qualified workforce	54,3
Limited demand in the local market	48,6
Rising labor costs.	28,6
Unfair competition, such as price dumping	24,3
Regulatory framework (related to issues such as labor laws, public procurement procedures, tax regulations; frequent changes; non-competitiveness of regulatory framework)	24,3
Loss of existing workforce	21,4
Corruption	15,7
Lack of fiscal incentives	12,9
Obsolete products (requiring research and development, product delivery time)	10,0
Difficulty in keeping up with technological changes	8,6
Growing competition (new entrants in the market)	8,6

Price competition / low profit margins	7,1
Available sources of funding do not meet your needs	5,7
Obsolete products (requiring research and development, product delivery time)	4,3
Inability to finance necessary investments in equipment.	4,3

Innovations..	DA
Innovations in services - new or significantly improved services	88,6
Innovations in products - new or significantly improved products	82,9
Innovations in processes	82,9
Innovations in organization - new or significantly improved internal business processes, decision-making methods, or external relations	62,9
Innovations in business model	52,9
Work on the development of new technologies (AI, machine learning, cybersecurity)	51,4
Work on scientific research projects	45,7

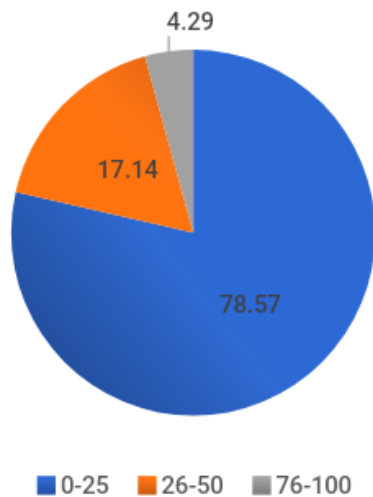
Out of the total number of companies, 31.4% introduced source code as an innovation that was subject to intellectual property protection. Other notable innovations include branding, which was worked on by 27.7% of companies, and design, which accounted for 12.9% of companies' efforts.

Graph 19. Was any innovation subject to intellectual property protection? (% out of 70)



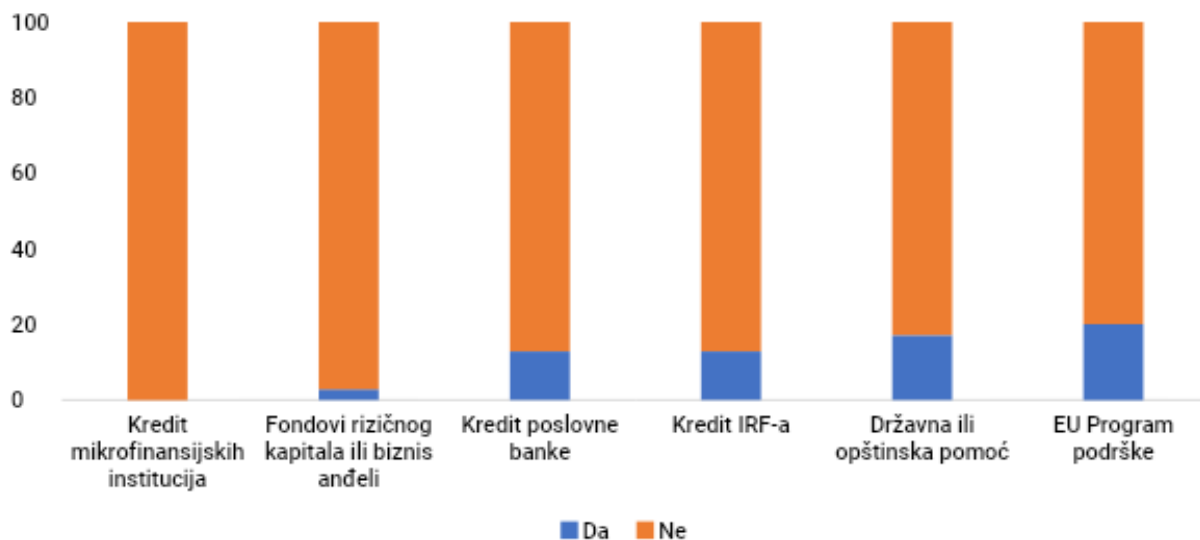
Out of the total number of companies, 12.8% did not allocate funds for innovation. Among other companies, an average of 20.1% of total revenue is directed towards innovation. One in every five companies allocates 30% or more of their revenue to innovation.

Graph 20. Percentage of total annual revenues spent on research and development activities during 2022, (% out of 70)



During the period from 2018 to 2022, 20% of companies received financial support from EU programs for their innovation activities. Slightly less, 17.1% of companies received support from state or municipal assistance. Credit from IRF (Innovation and Research Fund) or commercial banks was utilized by 13% of companies each. None of the companies that participated in the research received credit support from microfinance institutions.

Graph 21. Financial support for innovation activities during the period of 2018-2022, (% out of 70)



For 41.4% of companies, a significant obstacle identified was the complicated procedure for seeking non-refundable funds. Lack of own funds for innovation was highlighted by 35.7% of companies, while difficulties in obtaining state grants or subsidies for innovation were mentioned by 34.3% of companies.

Table 10. Barriers to innovation activities, (% out of 70)

	%
Complicated procedure for seeking non-refundable funds	41,4
Lack of own funds for innovation	35,7
Difficulties in obtaining government grants or subsidies for innovation	34,3
High interest rates	31,4
Uncertain demand in the market for your innovative ideas	25,7
Administrative barriers (e.g. difficulties in obtaining permits)	24,3
Lack of partners for collaboration in innovation activities	22,8
Lack of qualified personnel in your company	20,0
Innovation costs were too high	20,0
Difficulties in obtaining loans	18,6
Too much competition in your primary market	7,1

According to the surveyed companies, in line with previously identified barriers related to lack of financial resources, factors that could contribute to increased innovation activities are primarily financial in nature. Specifically, 68.6% of companies believe that introducing tax incentives for investments in research and development would contribute to increased innovation activities. Additionally, 64.3% of the surveyed companies identified a scheme of special grants for innovation development as an important factor. According to the surveyed companies, the least importance for increasing innovation activities is attributed to faster implementation of EU regulations (1.4%).

Table 11. The most important factors that would contribute to increased innovation activities, in % (n=70)

	%
Introduction of tax incentives for investments in research and development	68,6
Scheme of special grants for innovation development	64,3
Creation of closer collaboration with research institutions and universities, not applicable to us	31,4
Credit support for innovation development with subsidized interest rates	17,1
Credit support for innovation development with low collateral requirements	8,6
Scheme of special guarantees for obtaining loans	4,3
Faster implementation of EU regulations	1,4
Introduction of tax incentives for investments in research and development	68,6
Scheme of special grants for innovation development	64,3

Expectations for the next 3 years

According to the surveyed IT companies, expectations for the next three years are positive, as indicated by expected trends in future revenues, entry into new markets, employment growth, and innovation. Only 4.3% of the surveyed 70 companies do not expect revenue growth in the next period, while an additional 12.8% expect revenue

growth of up to 5%. The remaining surveyed companies expect an average revenue growth of 22% over the next three years.

Ambitions of the surveyed companies are slightly lower when it comes to export activities, as 35.7% of the surveyed companies do not plan to engage in exports in the next three years. Companies that plan to engage in exports expect an average growth in export activities of 23.4%, with a median (most common response) of 15%. Export activities are primarily planned for regional countries (56.6%), the USA (30.2%), and European Union countries (22.6%).

81.4% of the surveyed companies plan to develop new products and new business activities in the next three years. 46.4% of the surveyed companies plan to develop new specialized software and hardware solutions. 12.5% of the companies plan to develop new technologies, improve existing products, and create new products. In the next three years, 10.7% of the companies plan to develop AI software. Less than 5% of the companies see their new products/business activities in the development of mobile applications, education, and start-up development.

Table 12. Planned new products/activities in the next 3 years, as a percentage (n=56)

	%
Development of various new specialized software and hardware solutions	46.43
Development of new technologies	12.50
Improvement of existing products and development of new products	12.50
Development of AI software	10.71

According to the survey results, 87.1% of companies plan to create new jobs in the next three years. These companies are expected to create a total of 725 new jobs. The average number of new jobs per company is 12, with a median of 5, indicating that 5 is the most common response for the number of new jobs planned.

The majority of companies (70.5%) plan to hire in the tech sector. Expansion of the product development and marketing sectors is planned by 52.5% and 37.7% of companies, respectively, while only 4.9% of surveyed companies expect new hiring in the legal department.

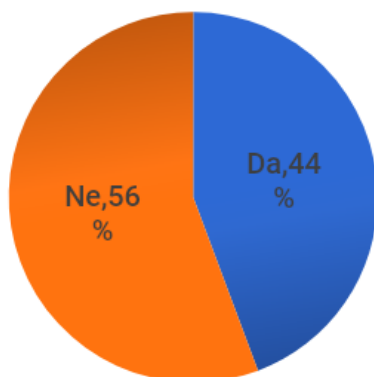
Table 13. Sectors where new employment is planned in the next three years, in % (n=61)

	%
Tech	70,5
Product development	52,5
Marketing	37,7
Customer support	34,4
Sales	31,2
Design	27,9

R&D	22,9
Senior management	21,3
Administrative roles	21,3
Human resources	14,7
Finance	9,8
Legal services	4,9

Of the total surveyed companies, 82.8% plan for their employees to spend a certain portion of their time on new product development. In the next three years, 55.7% of them plan to create spin-offs and start-ups.

Graph 22. Companies planning to create spin-offs and startups, in % (n=70)



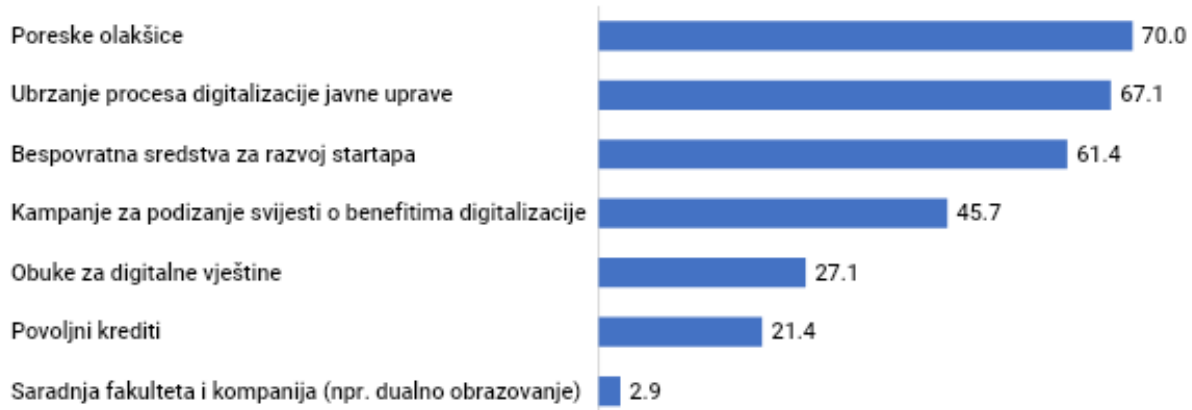
Preferred support measures

The surveyed companies were asked to indicate the top three measures of support they consider most necessary for further development of the IT sector in Montenegro. The following graph shows the responses obtained:

- Tax incentives (70.0%)
- Acceleration of the digitization process of public administration (67.1%)
- Non-refundable funds for startup development (61.4%)

These measures were identified as the most needed forms of support by the surveyed companies.

Graph 23. The most needed measures to support further development of the IT sector in Montenegro, in % (n=70)

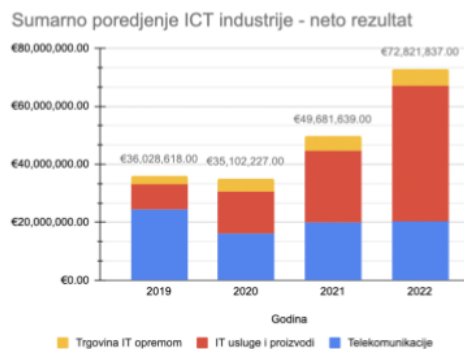
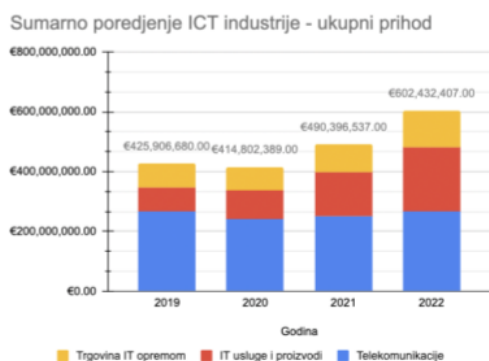


As an important segment for improving the ecosystem for the development of the IT sector in Montenegro, 37.5% of companies emphasize the introduction of PayPal or another credible payment processor. Education (12.50%) could also contribute significantly to improvement, while 10% of companies suggested regulatory changes as a necessary step.

Analysis of financial results of ICT companies⁴⁰

This analysis covered 1,049 companies that were part of the Montenegrin ICT sector in 2022 alone. However, to make the analysis comprehensive, the period from 2019 to 2022 was considered, tracking the trends of growth or decline in the three specific groupings of the ICT sector: IT services and products, telecommunications, and trade of IT equipment.

⁴⁰ Additional in-depth analysis generated by ICT Cortex, in cooperation with Chamber of Commerce and BI Info Consulting, including 1049 companies



2022/2021.



total revenues
22,85%

2022/2019.



total revenues
41,45%

2022/2021.



Neto result
46,58%

2022/2019.



Neto result
102,12%

Regarding the revenues generated in the ICT field during the previous year, the figures were more than impressive. The total revenue for the ICT sector in 2022 amounted to as much as 602 million euros, which is 23 percent higher than in 2021. 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.

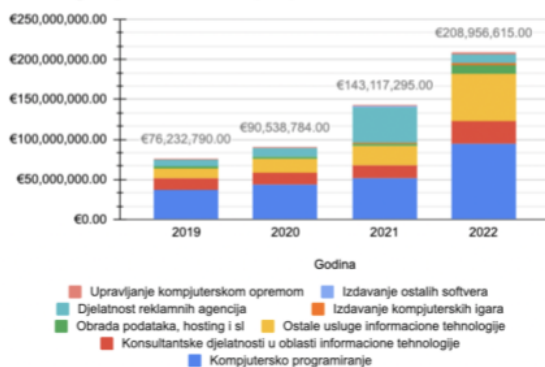
Some of the companies that particularly stood out in terms of revenue in the previous period and made significant contributions to the revenue growth in the Montenegrin ICT sector are [M-tel](#), [Crnogorski Telekom](#), [One](#), [Kodio](#), [Comtrade](#), and [Coinis](#).

Below, you can see the individual contributions of each of the mentioned areas to the information and communication technology sector.

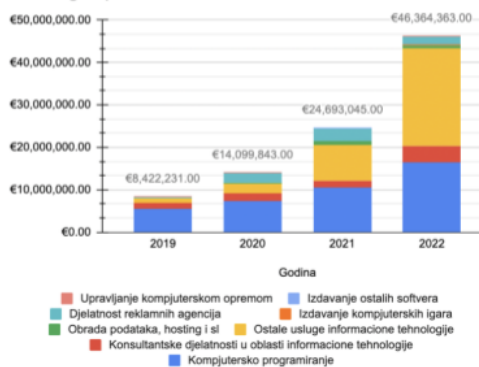
IT Services and Products

Regarding the IT sector, we analyzed 725 companies actively operating in the local and international markets. The largest number of these companies are engaged in computer programming and consulting activities in the field of information technology, while specialized areas such as computer game development and software publishing are represented in a smaller number. It is worth noting that this field has seen a significant increase in the number of companies, with a growth rate of 46 percent compared to 2021 and a remarkable 109 percent compared to 2019.

IT usluge i proizvodi - ukupni prihod



IT usluge i proizvodi - neto rezultat



2022/2021.



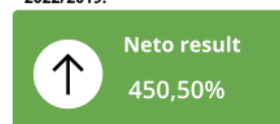
2022/2019.



2022/2021.



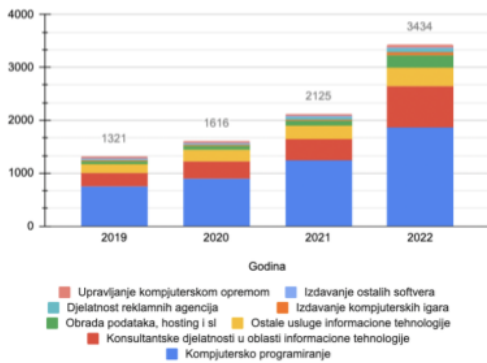
2022/2019.



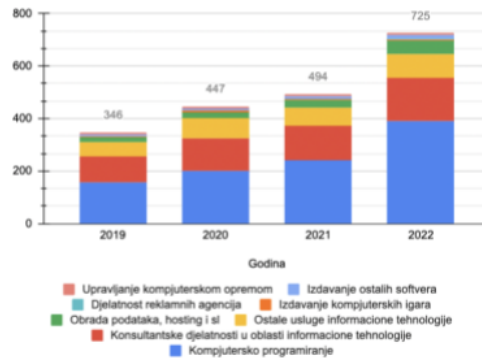
Companies in the IT services and products sector have made the most progress in the past four years when considering parameters such as total revenue, net results, and the number of employees. Total revenues increased by 45 percent compared to 2021, net results increased by 87 percent, and compared to 2019, the same parameter increased by an impressive 450 percent.

The number of employees adequately follows the revenue growth, as indicated by the fact that over 3,400 workers have been employed in the IT products and services sector, which is 61 percent more than the previous year and a remarkable 161 percent increase compared to four years ago. When looking at the specific specialization, the largest number of companies are engaged in computer programming and IT consulting activities. Some of the companies that achieved the best results are [Epam Systems Montenegro](#), [Domen](#), [Data Design](#), [Čikom](#), and [Logate](#).

IT usluge i proizvodi - broj zaposlenih



IT usluge i proizvodi - broj firmi



2022/2021.



2022/2019.



2022/2021.



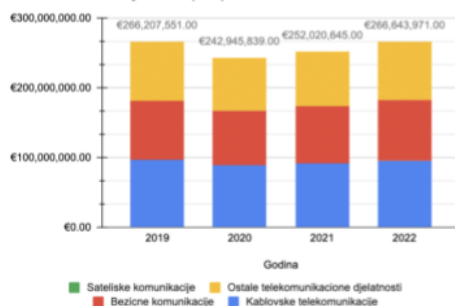
2022/2019.



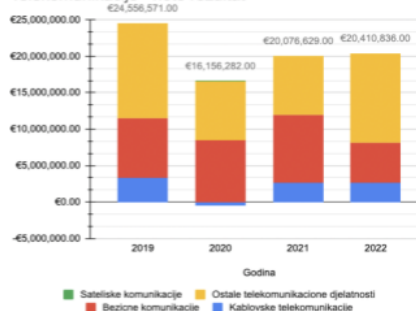
Telecommunications

In the field of telecommunications, we analyzed 66 companies operating in our market. Over 60 percent of them are registered under the activity code “other telecommunications activities,” while a smaller number are involved in satellite and wireless communications, as well as cable telecommunications. Here, we have a slightly different picture compared to the IT sector. The growth rate of the number of companies over the past four years is only 1.5 percent, indicating that the telecommunications sector is relatively stable, with few changes in the number of firms in the previous period, averaging 64.

Telekomunikacije - ukupni prihod



Telekomunikacije - neto rezultat



2022/2021.



Total revenues

5,80%

2022/2019.



Total revenues

0,16%

2022/2021.



Neto result

1,66%

2022/2019.

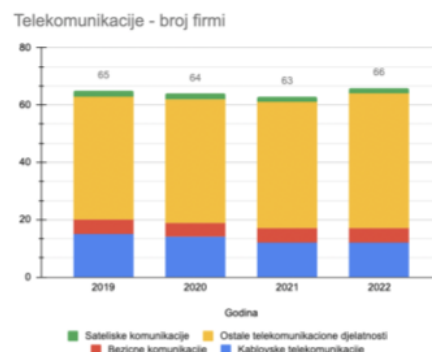
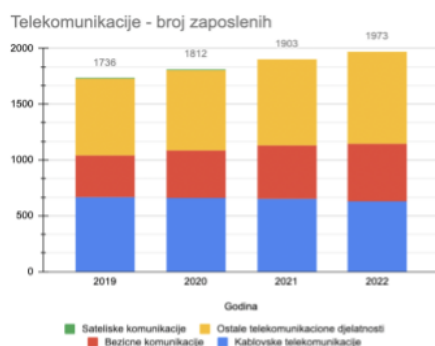


Neto result

-16,88%

Companies in the telecommunications sector have traditionally continued to generate impressive revenues. However, these revenues do not show significant fluctuations like those observed in the IT sector. The total revenue of Montenegrin companies engaged in telecommunications activities amounted to 266 million euros, which is nearly six percent higher than in 2019.

Net results also did not experience significant growth, with an increase of less than 2 percent compared to 2021 and a decrease of nearly 17 percent compared to four years ago, indicating that the overall profit in this sector was significantly higher in 2019 than it is today. The three traditional telecommunications providers operating in our market, namely [M-tel](#), [Crnogorski Telekom](#), and [ONE](#), achieved the best results in this field. Significant results were also achieved by companies such as [Telemach](#), [Ericsson AB](#), [the Agency for Electronic Communications and Postal Services](#), and [Network Communication](#).



2022/2021.



Number of employees
3,68%

2022/2019.



Number of employees
13,65%

2022/2021.



Number of companies
4,76%

2022/2019.



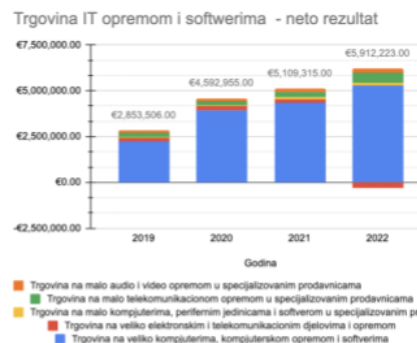
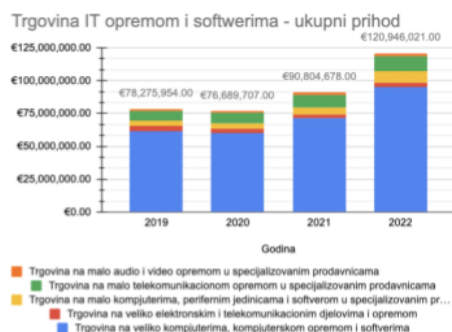
Number of companies
1,54%

The total number of employees in this sector is 1,973, with as much as 65 percent of them employed in the three leading companies in the telecommunications sector (M-tel, Crnogorski Telekom, and ONE). This number is nearly 14 percent higher than in 2019.

Trade of Computer Equipment

Regarding the sector related to the trade of computer equipment, it should be highlighted that the total revenue in 2022 amounted to nearly 121 million euros, which is 33 percent higher than the previous year. Compared to 2019, this represents a 54 percent increase, while net profit for the same period has increased by 107 percent, reaching almost 6 million euros.

Cortex Trade of computer equipment



2022/2021.



2022/2019.



2022/2021.

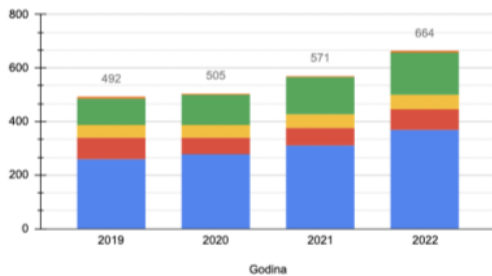


2022/2019.



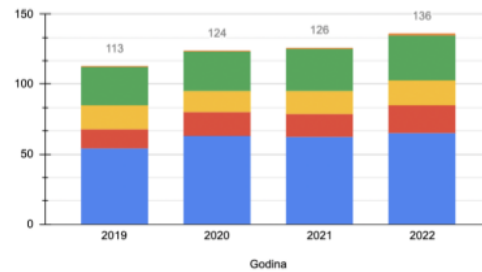
The majority of companies in this field are primarily engaged in the wholesale trade of computers, computer equipment, and software, while a smaller number focus on the retail trade of telecommunications equipment, audio, and video equipment, as well as the wholesale trade of electronic and telecommunications parts. The number of employees in this sector increased by 16 percent in the previous year, reaching 664, which is a significant advancement, especially when comparing it to the number of employees in 2019, which stood at 492. Some of the companies in this sector that achieved significant results in the previous period include [Comtrade](#), [KimTec](#), and [EWE Montenegro](#).

Trgovina IT opremom i softwerima - broj zaposlenih



■ Trgovina na malo audio i video opremom u specijalizovanim prodavnicama
■ Trgovina na malo telekomunikacionom opremom u specijalizovanim prodavnicama
■ Trgovina na malo kompjuterima, periferim jedinicama i softverom u specijalizovanim pr...
■ Trgovina na veliko elektronskim i telekomunikacionim djelovima i opremom
■ Trgovina na veliko kompjuterima, kompjuterskom opremom i softverima

Trgovina IT opremom i softwerima - broj firmi



■ Trgovina na malo audio i video opremom u specijalizovanim prodavnicama
■ Trgovina na malo telekomunikacionom opremom u specijalizovanim prodavnicama
■ Trgovina na malo kompjuterima, periferim jedinicama i softverom u specijalizovanim pr...
■ Trgovina na veliko elektronskim i telekomunikacionim djelovima i opremom
■ Trgovina na veliko kompjuterima, kompjuterskom opremom i softverima

2022/2021.



number of
employees
16,29%

2022/2019.



number of
employees
34,96%

2022/2021.



number of
companies
7,94%

2022/2019.



number of
companies
20,35%

Information and Communication Technologies in the Past Ten Years

The progress of the information technology (IT) sector in Montenegro is best observed by examining its chronological development. At the beginning of the previous decade, in 2012, the total revenue of the ICT sector exceeded 124 million euros, accounting for nearly four percent of the country's GDP at that time. Today, the contribution of this sector to the Montenegrin economy is significantly higher. The total revenue of the ICT sector in 2022 amounted to 602 million euros, reaching ten percent of the total GDP according to the previously mentioned data and parameters. Based on the analysis, we can conclude that the share of information technology in the national gross domestic product has increased by just over six percent in the last ten years, further demonstrating the constant development and growing importance of the ICT sector in the Montenegrin economy.

The advantages of IT compared to these three industries are reflected in its exponential growth, which has been consistently observed, especially in the past four years. The ICT industry employs over 6,000 people, with nearly 3,500 working in the IT domain. It is evident that this is one of the most promising economic sectors in Montenegro, and we are yet to see its full potential in the coming years.

“Positive trends in the ICT sector in Montenegro have continued in 2022. The financial reports for the year confirm a constant increase in the number of companies, their revenues, and the number of employees, particularly in the area of IT services and

products. In addition to the local players, this growth has been contributed to by foreign companies, indicating that Montenegro is recognized as a favorable destination for the development of this industry. Considering this, it would be important to reciprocate the expressed confidence and continue working on a business environment that provides reasons for foreign companies to stay while also supporting domestic IT companies and those yet to emerge, as they are expected to drive the process of digital transformation that lies ahead,” stated Ratko Nikolić, founder of Bi Consulting, a member of the ICT cluster Cortex.

Rapid growth, export potential, and investment opportunities

Based on ICT analysis and research conducted by CEED Consulting, it can be concluded that the ICT sector is one of the fastest-growing, at least 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.

Furthermore, an important aspect to highlight is the large number of newly established companies, whose results will be visible in the upcoming years and are likely to play a significant role in the Montenegrin ICT sector.

In conclusion, the ICT industry, especially the area focused on information technology, has made significant progress in the past four years, as evidenced by the research findings. With such results, Montenegro has become an important country for investments in the field of information technology and an attractive destination for digital nomads. For these reasons, the ICT sector undoubtedly deserves special attention from governmental institutions and the non-governmental sector. Based on the obtained results, we can anticipate that the information and communication technology sector will continue to grow and has the potential to become a strategic branch in the development of the Montenegrin economy.

Analysis of financial results of ICT companies⁴¹

ICT Cortex, a cluster whose main focus is on education, internationalization and digital transformation, analyzed the business results of the Montenegrin ICT sector. Total revenues, net results, number of employees, as well as the number of companies themselves were taken as criteria for ranking success. A significant contribution to the analysis is the research conducted by the consulting company CEED Consulting. Also, the company BI Consulting had a large share in the analysis, whose portal BInfo.me was the main source of data for specific activity codes important for the industry.

This analysis covered **1,049 companies that were part of the Montenegrin ICT sector in 2022 alone**. However, to make the analysis comprehensive, the period **from 2019 to 2022** was considered, tracking **the trends of growth or decline** in the three specific groupings of the ICT sector: **IT services and products, telecommunications, and trade of IT equipment**.

According to the ISIC Rev.4 classification, the ICT sector in Montenegro includes the following categories:

ICT manufacturing industry:

This category includes the manufacture of electronic components, computers and peripheral equipment, communication equipment, consumer electronic devices, magnetic and optical record carriers.

ICT trade:

This category includes wholesale of computers, computer peripherals, software, electronic and telecommunications equipment and parts. It also includes the retail sale of computers, peripherals, software, telecommunications equipment, audio and video equipment in specialized stores.

ICT services:

⁴¹ Additional in-depth analysis generated by ICT Cortex, in cooperation with Chamber of Commerce and BI Info Consulting, including 1049 companies

This category is divided into telecommunications and information technology (IT) services. Telecommunications include wired, wireless and satellite telecommunication activities, while IT services include computer programming, computer consulting activities, computer facilities management, other information technology activities and computer services, data processing, hosting, web portals and repair of computers and communication equipment.

The activity codes that were used to collect data related to the mentioned categories are:

2611-Production of electronic elements

2620-Manufacturing of computers and peripheral equipment

2630-Production of communication equipment

2640-Production of consumer electronic devices

2680-Production of magnetic and optical record carriers

4651- Wholesale of computers, computer equipment, software

4652-Wholesale of electronic and telecommunication parts and equipment

4741-Retail sale of computers, peripherals and software in specialized stores

4742-Retail trade in communication equipment in specialized stores

5821-Publishing of computer games

5829-Issue of other software

6110-Cable telecommunications

6120-Wireless communications

6130-Satellite communication

6190-Other communication activities

6201-Computer programming

6202-Consulting activities in the field of information technology

6203-Management of computer equipment

6209-Other information technology services

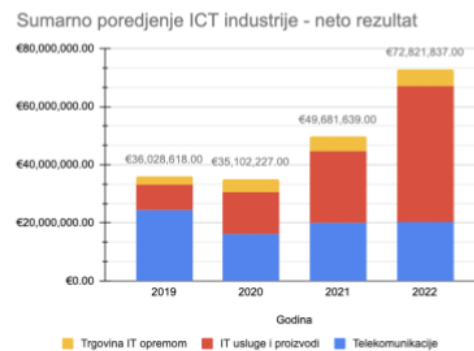
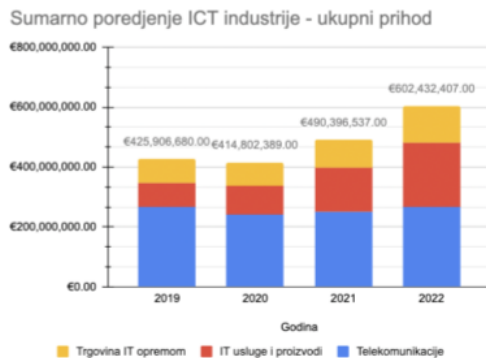
6311-Data processing, hosting, etc.

6312-Web portals

9511-Repair of computers and peripheral equipment

9512-Repair of communication equipment

Cortex Summarized comparison of ICT



2022/2021.



total revenues
22,85%

2022/2019.



total revenues
41,45%

2022/2021.



Neto result
46,58%

2022/2019.



Neto result
102,12%

Regarding the revenues generated in the ICT field during the previous year, the figures were more than impressive. The total revenue for the ICT sector in 2022 amounted to

as much as **602 million euros**, which is **23 percent higher than in 2021**. 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**.

Some of the companies that particularly stood out in terms of revenue in the previous period and made significant contributions to the revenue growth in the Montenegrin ICT sector are **M-tel, Crnogorski Telekom, One, Kodio, Comtrade, and Coinis**.

Below, you can see the individual contributions of each of the mentioned areas to the **information and communication technology sector**.

IT Services and Products

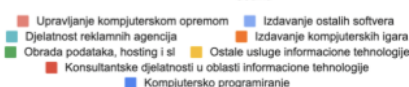
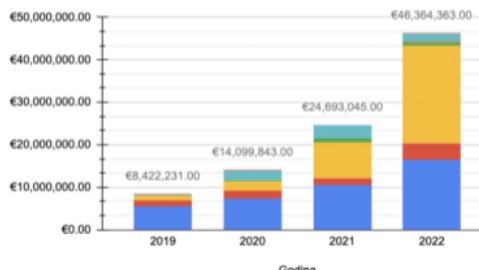
Regarding the **IT sector**, we analyzed **725 companies** actively operating in the local and international markets. The largest number of these companies are engaged in **computer programming and consulting activities in the field of information technology**, while specialized areas such as **computer game development and software publishing** are represented in a smaller number. It is worth noting that this field has seen a significant **increase in the number of companies**, with a growth rate of 46 percent compared to 2021 and a remarkable **109 percent** compared to 2019.

Cortex IT services and products

IT usluge i proizvodi - ukupni prihod



IT usluge i proizvodi - neto rezultat



2022/2021.



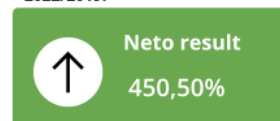
2022/2019.



2022/2021.



2022/2019.

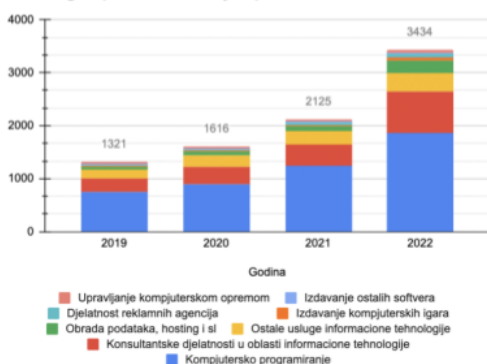


Companies in the **IT services and products sector** have made the **most progress** in the past four years when considering parameters such as total revenue, net results, and the number of employees. Total revenues increased by **45 percent** compared to 2021, net results increased by **87 percent**, and compared to 2019, the same parameter increased by an **impressive 450 percent**.

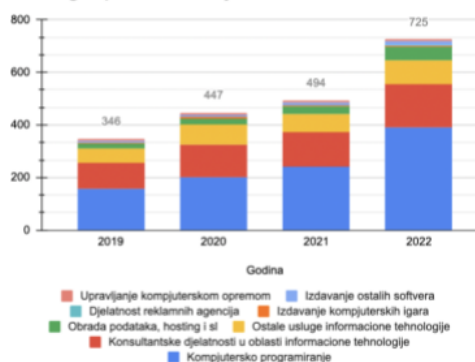
The number of employees adequately follows the revenue growth, as indicated by the fact that over **3,400 workers** have been employed in the IT products and services sector, which is **61 percent** more than the previous year and a remarkable **161 percent increase** compared to four years ago. When looking at the specific specialization, the largest number of companies are engaged in **computer programming and IT consulting activities**. Some of the companies that achieved the best results are **Epam Systems Montenegro, Domen, Data Design, Čikom, and Logate**.

Cortex IT services and products

IT usluge i proizvodi - broj zaposlenih



IT usluge i proizvodi - broj firmi



2022/2021.



2022/2019.



2022/2021.



2022/2019.



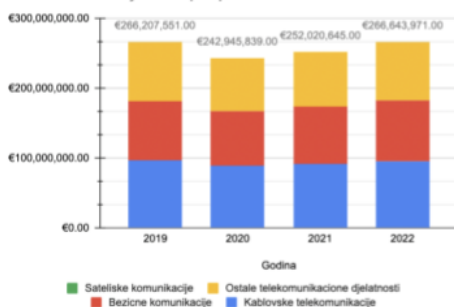
Telecommunications

In the field of **telecommunications**, we analyzed **66 companies** operating in our market. Over 60 percent of them are registered under the activity code “**other telecommunications activities**,” while a smaller number are involved in **satellite and wireless communications**, as well as **cable telecommunications**. Here, we have a

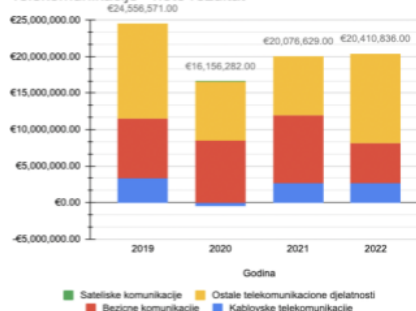
slightly different picture compared to the IT sector. The growth rate of the number of companies over the past four years is only **1.5 percent**, indicating that the telecommunications sector is **relatively stable**, with few changes in the number of firms in the previous period, **averaging 64**.

Cortex Sector: Telecommunications

Telekomunikacije - ukupni prihod



Telekomunikacije - neto rezultat



2022/2021.



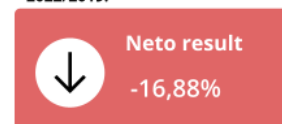
2022/2019.



2022/2021.

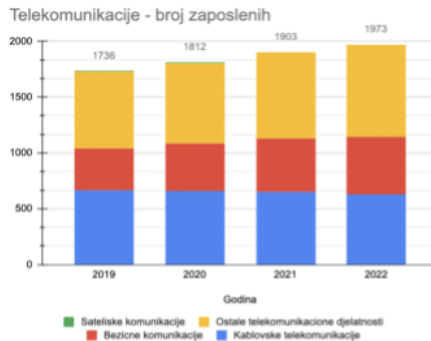


2022/2019.



Companies in the telecommunications sector have traditionally continued to generate impressive revenues. However, these revenues **do not show significant fluctuations** like those observed in the IT sector. The total revenue of Montenegrin companies engaged in telecommunications activities amounted to **266 million euros**, which is nearly **six percent higher than in 2019**.

Net results also did not experience significant growth, with an increase of **less than 2 percent compared to 2021** and a **decrease of nearly 17 percent compared to four years ago**, indicating that the overall profit in this sector was significantly higher in 2019 than it is today. The three traditional telecommunications providers operating in our market, namely **M-tel**, **Crnogorski Telekom**, and **ONE**, achieved the best results in this field. Significant results were also achieved by companies such as **Telemach**, **Ericsson AB**, **the Agency for Electronic Communications and Postal Services**, and **Network Communication**.



2022/2021.



Number of employees
3,68%

2022/2019.



Number of employees
13,65%

2022/2021.



Number of companies
4,76%

2022/2019.



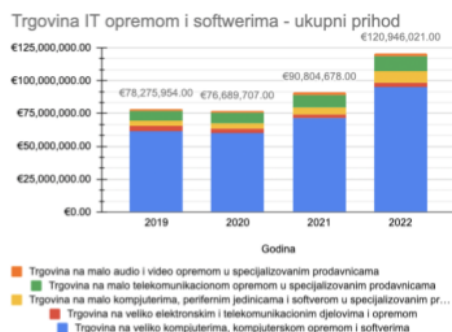
Number of companies
1,54%

The total number of employees in this sector is 1,973, **with as much as 65 percent of them employed in the three leading companies in the telecommunications sector (M-tel, Crnogorski Telekom, and ONE)**. This number is nearly **14 percent** higher than in 2019.

Trade of Computer Equipment

Regarding the sector related to the trade of computer equipment, it should be highlighted that the total revenue in 2022 amounted to nearly **121 million euros**, which is **33 percent higher than the previous year**. Compared to 2019, this represents a **54 percent increase**, while **net profit for the same period has increased by 107 percent**, reaching almost **6 million euros**.

Cortex Trade of computer equipment



2022/2021.



2022/2019.



2022/2021.

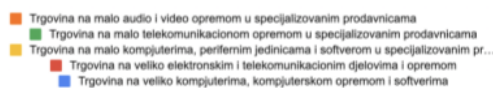
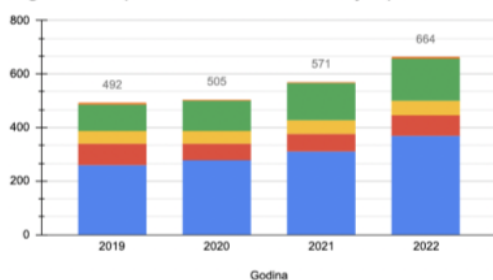


2022/2019.

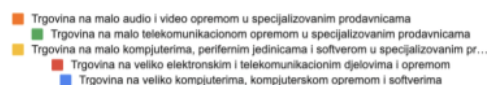
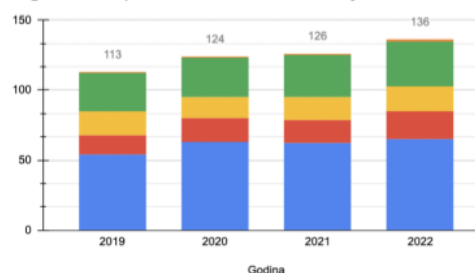


The majority of companies in this field are primarily engaged in the **wholesale trade of computers, computer equipment, and software**, while a smaller number focus on the **retail trade of telecommunications equipment, audio, and video equipment**, as well as the **wholesale trade of electronic and telecommunications parts**. The number of employees in this sector increased by **16 percent in the previous year, reaching 664**, which is a significant advancement, especially when comparing it to the number of employees in 2019, which stood at **492**. Some of the companies in this sector that achieved significant results in the previous period include **Comtrade, KimTec, and EWE Montenegro**.

Trgovina IT opremom i softwerima - broj zaposlenih



Trgovina IT opremom i softwerima - broj firmi



2022/2021.



2022/2019.



2022/2021.



2022/2019.



Information and Communication Technologies in the Past Ten Years

The progress of the **information technology (IT)** sector in Montenegro is best observed by examining its chronological development. At the beginning of the previous decade, in 2012, the **total revenue of the ICT sector exceeded 124 million euros**, accounting for nearly **four percent of the country's GDP at that time**. Today, the contribution of this sector to the Montenegrin economy is significantly higher. The total revenue of the ICT sector in 2022 amounted to **602 million euros**, reaching **ten percent of the total GDP** according to the previously mentioned data and parameters. Based on the analysis, we can conclude that the share of information technology in the national gross domestic product has increased by just over **six percent** in the last ten years, further demonstrating **the constant development and growing importance of the ICT sector in the Montenegrin economy**.

The advantages of IT compared to these three industries are reflected in its exponential growth, which has been consistently observed, especially in the **past four years**. The ICT industry employs over 6,000 people, with nearly **3,500 working in the IT domain**. It is evident that this is one of the most promising economic sectors in Montenegro, and we are yet to see its **full potential** in the coming years.

“Positive trends in the ICT sector in Montenegro have continued in 2022. The financial reports for the year confirm a constant increase in the number of companies, their

revenues, and the number of employees, particularly in the area of IT services and products. In addition to the local players, this growth has been contributed to by foreign companies, indicating that Montenegro is recognized as a favorable destination for the development of this industry. Considering this, it would be important to reciprocate the expressed confidence and continue working on a business environment that provides reasons for foreign companies to stay while also supporting domestic IT companies and those yet to emerge, as they are expected to drive the process of digital transformation that lies ahead,” stated Ratko Nikolić, founder of Bi Consulting, a member of the ICT cluster Cortex.

Rapid growth, export potential, and investment opportunities

Based on ICT analysis and research conducted by **CEED Consulting**, it can be concluded that the **ICT sector is one of the fastest-growing, at least 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**.

Furthermore, an important aspect to highlight is the large number of **newly established companies**, whose results will be visible in the upcoming years and **are likely to play a significant role in the Montenegrin ICT sector**.

In conclusion, the **ICT industry**, especially the area focused on **information technology**, has made significant progress in the past four years, as evidenced by the research findings. With such results, Montenegro has become an **important country for investments in the field of information technology** and an **attractive destination for digital nomads**. For these reasons, the ICT sector undoubtedly deserves special attention from **governmental institutions and the non-governmental sector**. Based on the obtained results, we can anticipate that the **information and communication technology sector** will continue to grow and has the potential to **become a strategic branch in the development of the Montenegrin economy**.

Conclusion

Montenegro has established a good foundation for the development of a digital society in the previous period, which needs to be further improved in parallel with technological advancements. However, without reliable infrastructure, sets of quality and open data, and a high level of automatic exchange, it is not possible to create e-services that meet the needs of citizens and businesses, nor is it possible to ensure equal access for users. The essence of the transformation towards a digital society lies in the establishment of quality physical and technological infrastructure, as well as in the provision of accessible high-quality data and their proper use to create new value.

Data represent a tremendous resource for improving people's lives, solving social challenges, generating new economic growth, and securing Montenegro's competitive position in the digital transformation process. However, it should be noted that data management poses challenges related to trust, privacy, security, and ethical principles while respecting legal norms.

The presence of a digitally educated workforce, engagement of local IT experts, and raising public awareness about the importance of digital technology application and education are prerequisites for creating a knowledge-based society that underpins a digital society. Education and training, from the lowest level of education to the highest level and adult education through specialized topics, can yield positive long-term results. Raising public awareness about the significance and benefits of technology and technology-supported solutions is an essential element in the digital transformation process. Montenegro recognizes the need to strengthen this element of the digital society, as without knowledge and knowledge sharing, it is not possible to implement or use solutions in a digitally transformed society. Moreover, quality and inclusive education based on smart use of digital technologies are a prerequisite for the sustainability of all other measures and interventions. Initiatives and activities of the business sector are important for strengthening the (digital) economy and society as a whole, as this category represents one of the key drivers of innovative solutions and their practical application. Recognizing the key role of the IT sector in Montenegro, supporting their initiatives and innovative solutions, and involving this sector in the digital transformation processes, with the common goal of creating a knowledge-based society, will yield positive long-term results for Montenegrin digital society as a whole.

The faster digital development in other countries further highlights the relatively slow progress of digital development/maturity in Montenegro. It is necessary to work on building and strengthening citizens' trust in e-services. The recent cyber attack that completely halted the operation of networks and numerous websites has further contributed to distrust and insecurity. Montenegro's small market size could pose a problem for two reasons: a small market will significantly hinder the development of large specialized companies, and the lack of export-oriented companies in the IT sector may limit the opportunities for growth and

international cooperation. It is important to address these challenges and take necessary measures to accelerate the digital development of Montenegro and create a secure, inclusive, and competitive digital society.⁴²

The average IT company in Montenegro was founded in 2011 or 2012, owned by a local legal or natural person, usually a male, and managed by a male. On average, it employs 22 people and is engaged in computer programming. The majority of its revenue comes from the development and placement of its own IT solutions (software or mobile and web applications), as well as software development for others, known as "outsourcing". Its dominant business model is B2B, primarily targeting international and domestic companies operating in Montenegro.

Despite positive and growing trends in all parameters related to the IT sector in Montenegro, IT companies are not overly satisfied with the ecosystem for IT sector development, rating it an average of 5.19 on a scale of 1 (not satisfied at all) to 10 (completely satisfied). Limited availability of suitable new talent and limited demand in the local market are the most important factors limiting the growth and development of the IT sector in Montenegro. Nevertheless, IT sector companies continue to innovate, primarily in new products, services, and processes, and expect revenue growth, export activities, and employment growth in the next three years. However, to achieve much better results, continuous work is needed to improve the business environment, particularly in terms of introducing tax incentives for IT business and creating special grant schemes for innovation and startups. In addition to the above, accelerating the process of digitizing public administration is crucial for further development of the IT sector in Montenegro.

⁴² [Strategija-digitalne-transformacije-Crne-Gore-2022-2026-sa-Akcionim-planom.pdf \(s3.me\)](#)

Bibliography

1. Public Administration Reform Strategy in Montenegro 2016-2020,
<https://www.gov.me/dokumenta/1a107a62-5961-4c9e-b8ce-8c8c652549e2>
2. Strategy for the Development of the Information Society in Montenegro until 2020,
<https://www.gov.me/en/documents/cc172acc-d7a7-4cf0-ba12-e3023ce721b2>
3. Smart Specialization Strategy of Montenegro 2019-2024,
<https://www.s3.me/sites/default/files/2019-09/Smart%20Specialisation%20Strategy%20of%20Montenegro%202019-2024.pdf>
4. Proposal of the Cyber Security Strategy of Montenegro 2018-2021,
<https://www.gov.me/dokumenta/fa24a8c6-2241-4d6f-9297-328636b157e5>
5. National Action Plan for the Implementation of the Open Government Partnership Initiative in Montenegro 2018-2020,
<https://www.otvorenauprava.me/wp-content/uploads/2018/12/NAP-engl.pdf>
6. Program for Attracting Digital Nomads to Montenegro until 2025,
<https://visaguide.world/digital-nomad-visa/montenegro/>
7. Program for Promoting Innovative Startups in Montenegro 2019-2021,
<https://www.gov.me/en/article/195229-programme-of-measures-promoting-innovative-start-ups-in-montenegro-and-accompanying-action-plan-adopted>
8. On the Edge of a Digital Future for All, National Human Development Report Montenegro 2020,
<http://hdr.undp.org/en/content/national-human-development-report-2020-montenegro>

9. IPSOS (2018), ICT as a Driver of Further Development of Montenegro - Research on the Current and Potential Impact of ICT on Montenegro's Development, https://www.me.undp.org/content/montenegro/sr/home/library/human_development/NHDR2018.html
10. IT Sector in Montenegro - Overview of Current Status and Development Perspectives, https://www.privrednakomora.me/sites/pkcg.org/files/multimedia/gallery/files/2012/09/brosura_next_ict_sep_2015_2.pdf
11. UNDP (2018) ICT as a Driver of Further Development of Montenegro - Research on the Current and Potential Impact of ICT on Montenegro's Development, https://www.me.undp.org/content/montenegro/sr/home/library/human_development/NHDR2018.html
12. ICT Judiciary Development Program 2021-2023, <https://www.gov.me/dokumenta/7af1b58d-a6aa-4e62-8de2-75979dd42d0c>
13. Digital Spillover, https://www.huawei.com/minisite/qci/en/digital-spillover/files/qci_digital_spillover.pdf
14. ICT Market Outlook 2022-2026, <https://www.reportlinker.com/clp/global/597055#block-data-catalogue>
15. Industrial Policy of Montenegro 2019-2023, <https://www.gov.me/dokumenta/b6d2c966-ac8b-409a-bcf5-acdce90c36d9>
16. MONSTAT, <https://monstat.org/cg/page.php?id=17&pageid=17>
17. The analysis of Supply, Demand and Employment at the Labour Market in Montenegro in 2022, <https://www.zzzcg.me/wp-content/uploads/2023/03/Analiza-ponude-tra%C5%BEije-i-za-po%C5%A1ljavanja-na-tr%C5%BEi%C5%A1tu-rada-u-Crnoj-Gori-u-2022.-godini.pdf>
18. Strategy for Montenegro 2021 - 2026, <https://www.ebrd.com/strategy-and-policy-coordination/strategy-in-montenegro-montenegrin.pdf>
19. Analysis of Montenegrin Economy in 2022, [PKCG_cg-privreda-2022.pdf](#)

20. 2030 Digital Compass: the European way for the Digital Decade,
<https://eufordigital.eu/wp-content/uploads/2021/03/2030-Digital-Compass-the-European-way-for-the-Digital-Decade.pdf>
21. Europe's Digital Decade: digital targets for 2030,
https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en#digital-rights-and-principles
22. Strategy for the Development of the Information Society in Montenegro until 2020, with the Report from the Public Consultation,
<https://www.gov.me/en/documents/cc172acc-d7a7-4cf0-ba12-e3023ce721b2>
23. Commission Staff Working Document, Montenegro 2022. Report,
(<https://neighbourhood-enlargement.ec.europa.eu/system/files/2022-10/Montenegro%20Report%202022.pdf>)
24. Report on the Work of the Council for e-Government for the Year 2021,
<https://www.gov.me/dokumenta/91092f09-73b4-4446-a7d2-880cd0378f7c>
25. Survey on Deficit Occupations in Montenegro in 202, December 2022,
<https://www.zzzcg.me/wp-content/uploads/2023/02/Istraživanje-Deficitarna-zanimanja-u-Crnoj-Gori-u-2021.-godini.pdf>
26. Digital Transformation Strategy of Montenegro 2022-2026,
<https://s3.me/wp-content/uploads/2022/06/Strategija-digitalne-transformacije-Crne-Gore-2022-2026-sa-Akcionim-planom.pdf>