

# ON THE VERGE OF A DIGITAL FUTURE FOR ALL

Montenegro Human Development Report 2020



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Montenegro Human Development Report 2020

December 2020

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UN Eco House, Stanka Dragojevića bb, 81 000 Podgorica, Montenegro

With special thanks to Daniela Gašparikova, UNDP Resident Representative in Montenegro, for her support and guidance in preparing a report which puts digital transformation in the function of providing a better standard of living, education and health of the population in Montenegro, leaving no one behind.

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### **Appreciation and acknowledgment:**

Many institutions and individuals provided their constructive contribution to the development of this report and we would like to especially acknowledge:

Miloš Bošković, Council of Europe

Montenegro Steering Committee for the preparation of the NHDR:

Branka Žižić, Ministry of Science

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Dražen Žujović, Ad Badger

We are also grateful for cooperation to all interviewees from state institutions, civil society, academia, business sector and other UN agencies, in particular to UNICEF, who gave their contribution to the development of the National Human Development Report.

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Graphic design, cover page and layout: BAAS // Bošković and Associates d.o.o.

First edition: 2020



## Foreword

We live in the era of the Fourth Industrial Revolution. 'Digital' is becoming the universal language in which we communicate with the entire planet, while our existence is becoming more and more 'virtual'. Faced with numerous challenges, we ask ourselves whether we are making sufficient efforts to provide a better standard of living, quality education and health, for us and the generations to come. The world is changing rapidly, economic and health crises are leaving damaging consequences, and while some people are successfully building resilience, others are falling into the clutches of enormous change and remain neglected. The human is the atom without which an entire organism is not sustainable, its survival depends on solidarity and unity and no matter how much our reality changes, human abilities, knowledge and skills are irreplaceable.

Through the concept of human development, UNDP continues to firmly believe that it is our shared responsibility to ensure a dignified life for all. The National Human Development Reports draw the attention of policy makers to the socio-economic development of the country, while identifying and taking into account the key global challenges and changes ahead of us. Although the rapid development of technology has heralded a "new reality" for some time, the COVID-19 pandemic has confirmed the need to turn to digital transformation which is accelerated and adequately managed.

For this reason, this National Human Development Report is the result of numerous studies and analyses that attempt to answer the question of how digital transformation can improve the quality of life of all citizens of Montenegro by 2030 and contribute to the country's achievement of the Sustainable Development Goals. While digital transformation has an impact on human development, a human is one who with knowledge, creative thinking and innovation can control and create a digital environment that does not perpetuate old inequalities but creates new ones, thus leaving no-one behind on the path of progress.

Although Montenegrin society has access to the internet at a level above the world average, and the frequency of its use is also very high, digital access is unevenly distributed. Social divides are evident, in geographical terms but also in the use of digital tools by society, depending on their age, gender and income. While the business community mostly sees digitalization as an opportunity and is responding more quickly and efficiently, citizens perceive it as a threat, believing that they will be increasingly replaced by robots and that most jobs will disappear from the market by automation. This view is often paired with limited use of digital tools to create new value or overcoming challenges such as those posed by the COVID-19 pandemic. That is why this report particularly emphasizes the potential of digital tools to be harnessed in order to progress human development.

Aware of two sides of digitalization, the report highlighted the threats and opportunities in the process of system reform, especially taking into account the impact on the labour market, education and the creation of an accountable and service-oriented administration. The roadmap for digital transformation in Montenegro is presented through the development of these three pillars, and by offering potential scenarios for the digital future of society. A set of appropriate policy options and ways to overcome the obstacles to digital transformation have been identified, in particular by capitalizing on the Smart Specialization and Information Society Development Strategies in Montenegro.

The report emphasizes the importance of the ICT industry, which, although in its infancy, is shaping experts who are tending to look for their jobs in other, more developed markets due to the lack of opportunities in Montenegro. How to retain them and how to attract digital nomads from other countries, while providing a competitive business environment for the accelerated development of start-up community, are precisely the questions the report answers. The pages before you also offer a shift in the developing priorities for economic growth, by positioning the development of ICT sector not only horizontally to support the all other development priorities, but also vertically, as a separate pillar of sustainable economic growth. A proactive approach from the Government of Montenegro is of the utmost importance, because the development of ICT strengthens the public administration and establishes two-way communication with citizens and the business sector. Also, the report suggests how digital skills should be cultivated from the earliest stages of schooling in order to enable students to choose in which direction they will develop their skills and knowledge.

The National Human Development Report opens up a debate on digital transformation and its implications for development and inequalities in society. The aim of the report is to facilitate the process of digital transformation of Montenegro, pointing out the policies that will contribute to reducing inequality, preserving jobs and the workforce, improving the educational curriculum, knowledge and skills, supported by strengthening responsible governance from the state level.

We hope that this report will be an inspiration for decision makers, but also for citizens and the business community on the joint path on which we strive to find common ground in creating a stable, sustainable and resilient society which offers equal opportunities for all.

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## Overview

No corner of the globe has been spared from the COVID-19 pandemic. Montenegro is no exception. Many underlying limitations in the human development fabric of the country were exacerbated – while others were uncovered. The theme of this year’s *Human Development Report* centres on a powerful approach to respond to the COVID-19 threat: digital transformation.

At the time of publication, Montenegro remained in the throes of the pandemic, experiencing setbacks and new challenges in health, economic growth and education. Rapidly rising from just a handful of confirmed cases in April 2020 to a peak of 957 new cases in a single day on 9 November 2020, the total number of cases per million inhabitants on 30 November 2020 was 56,146, and Montenegro was ranked third in the world according to this parameter. The pandemic risks a direct decline on human development not seen in a generation.

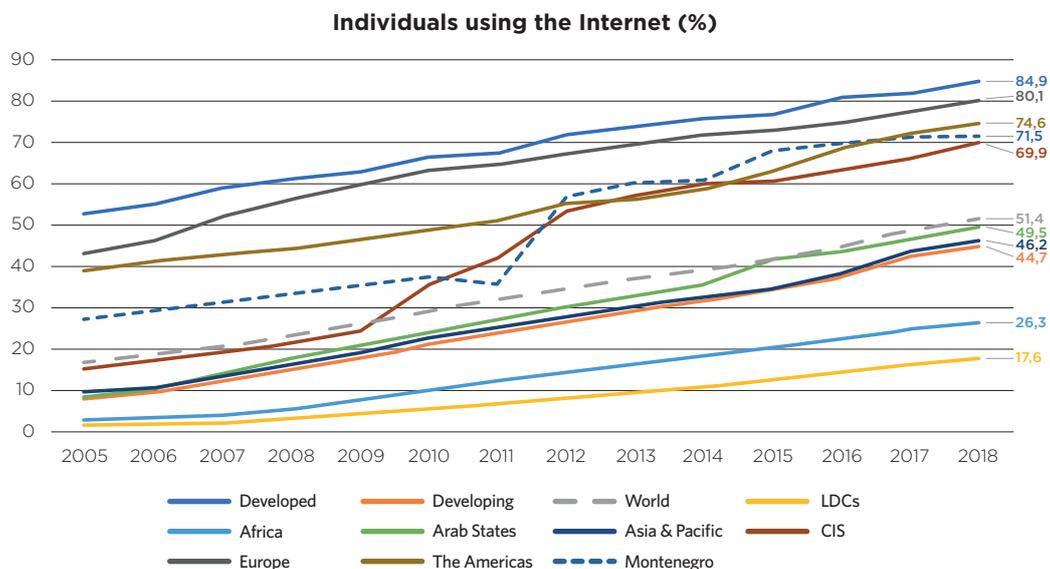
Thus, digital transformation enters the scene as both a response and a challenge. From the strong underpinnings of widespread internet connectivity, Montenegro has the opportunity to transform its economic, educational and e-government foundations to leverage the potential of a renewed digital society to expand inclusive human development in the immediate and long-term future. Yet challenges persist in terms of a restricted business environment, and a lack of support for innovation and for education reform that could significantly accelerate progress.

This report charts a path towards removing these obstacles.

## Human development and digital transformation in Montenegro

Well above the global average (53.6%), 71.5% of the population of Montenegro has access to the internet whether at home or outside it. However, despite strong progress, Montenegro stands below European trends (80.1%) and the average access rate for all developed countries (84.9%) – highlighting the opportunity for accelerated progress.

Figure 1 Internet access on the rise – everywhere

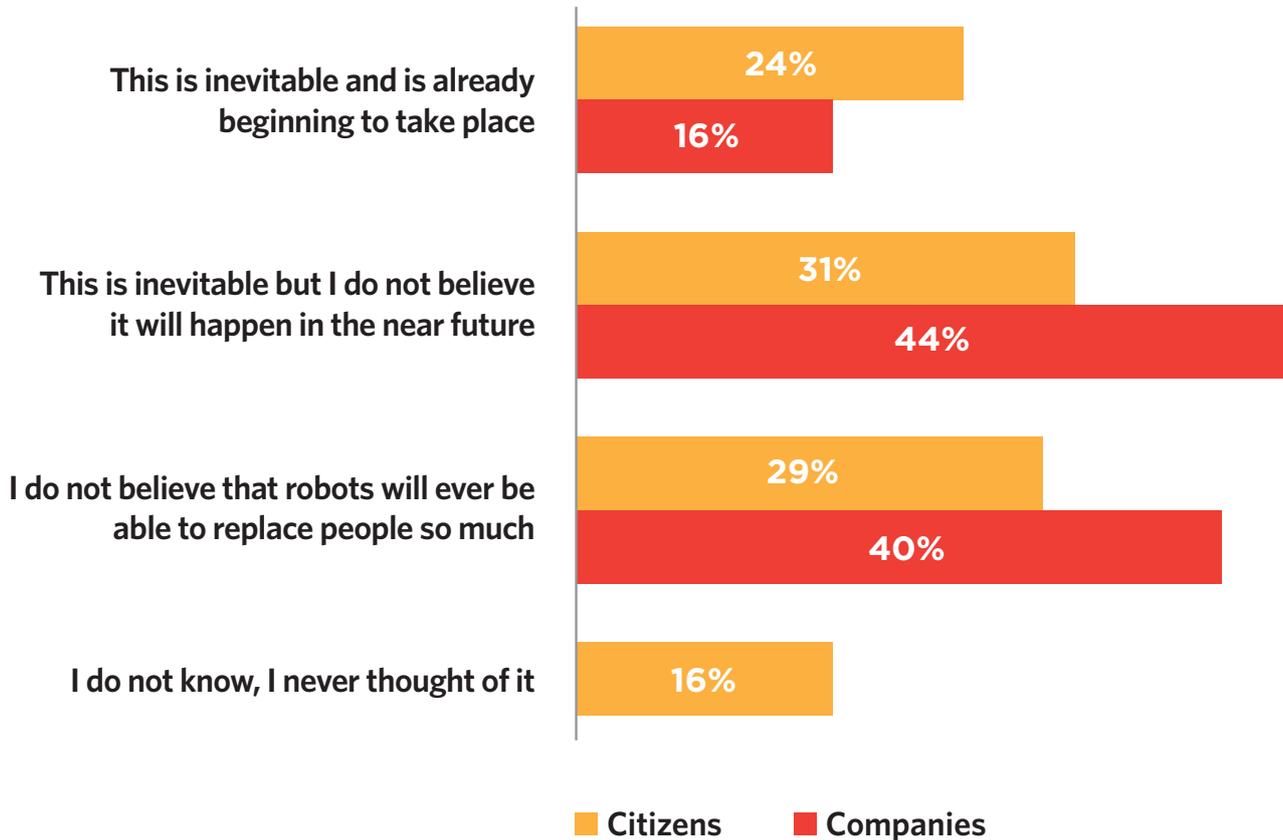


Source: ITU, 2020

But digital access is unevenly distributed along geographical lines in Montenegro. Access in rural areas is just 62.8% compared to 80% in urban areas. And a divide exists between the north and south of the country: internet access in the north is only 64.8%, while in the south, including the area of the capital, 79.2% are connected.

And a key challenge rests in terms of how people in Montenegro view the risks of digitalization. Although 24% of people in Montenegro are already feeling the impact of robots replacing their work, 44% do not believe this will happen in the near future.

Figure 2 Will robots replace people?



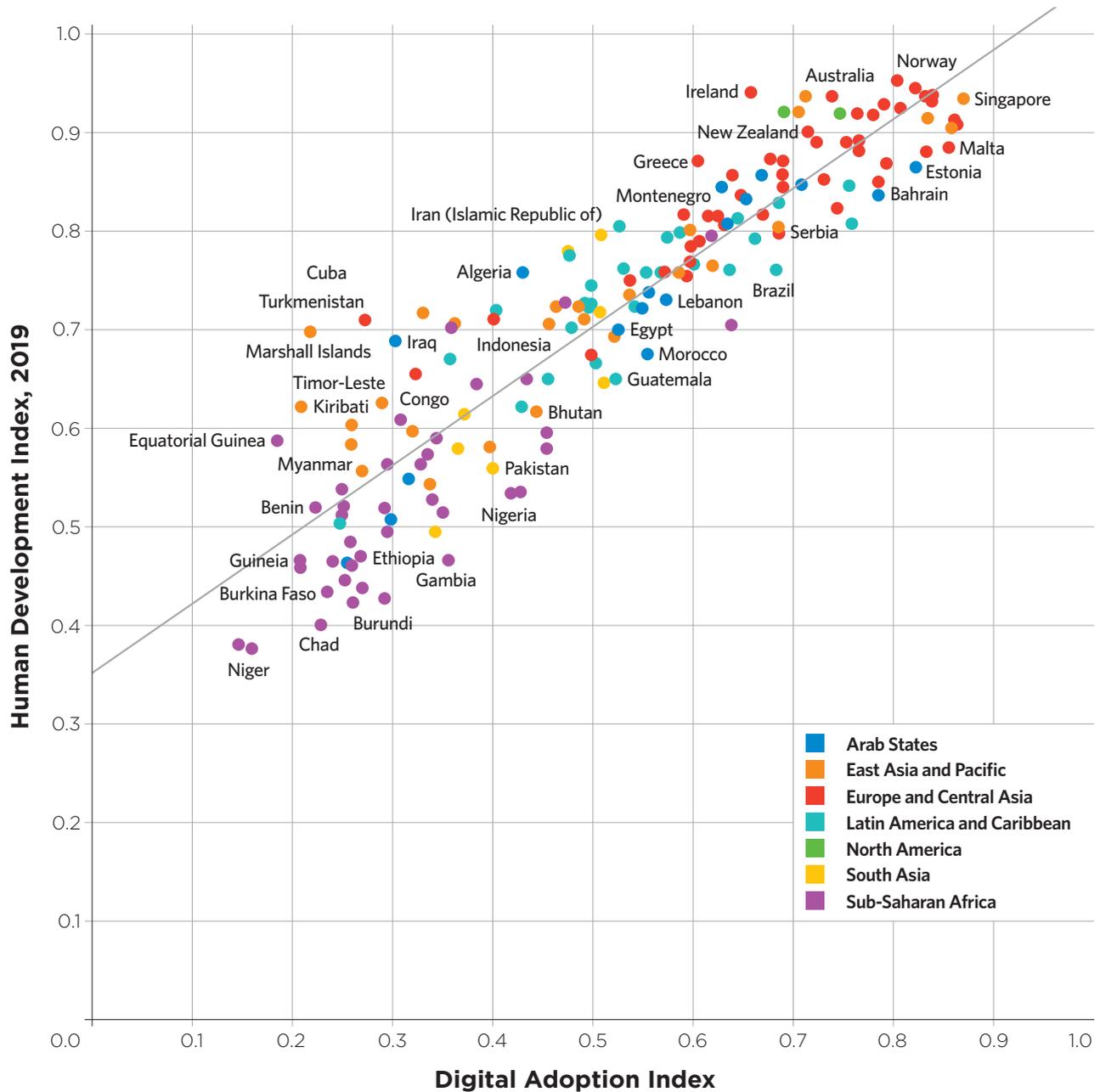
Source: Ipsos, 2018

## Human development and digital access: a virtuous cycle

Human history is the history of technological change: from basic hand tools to the washing machine to today’s smartphones: technology holds the potential to drive improvements in living standards and human wellbeing.

But while there is a correlation between measures of digital adoption and human development, the relationship is not automatic. For any given level of a digital adoption index (DAI), countries hold a wide range of HDI values. And the interrelationship is likely two-way and mutually reinforcing.

Figure 3 Links between human development and digital adoption, the world



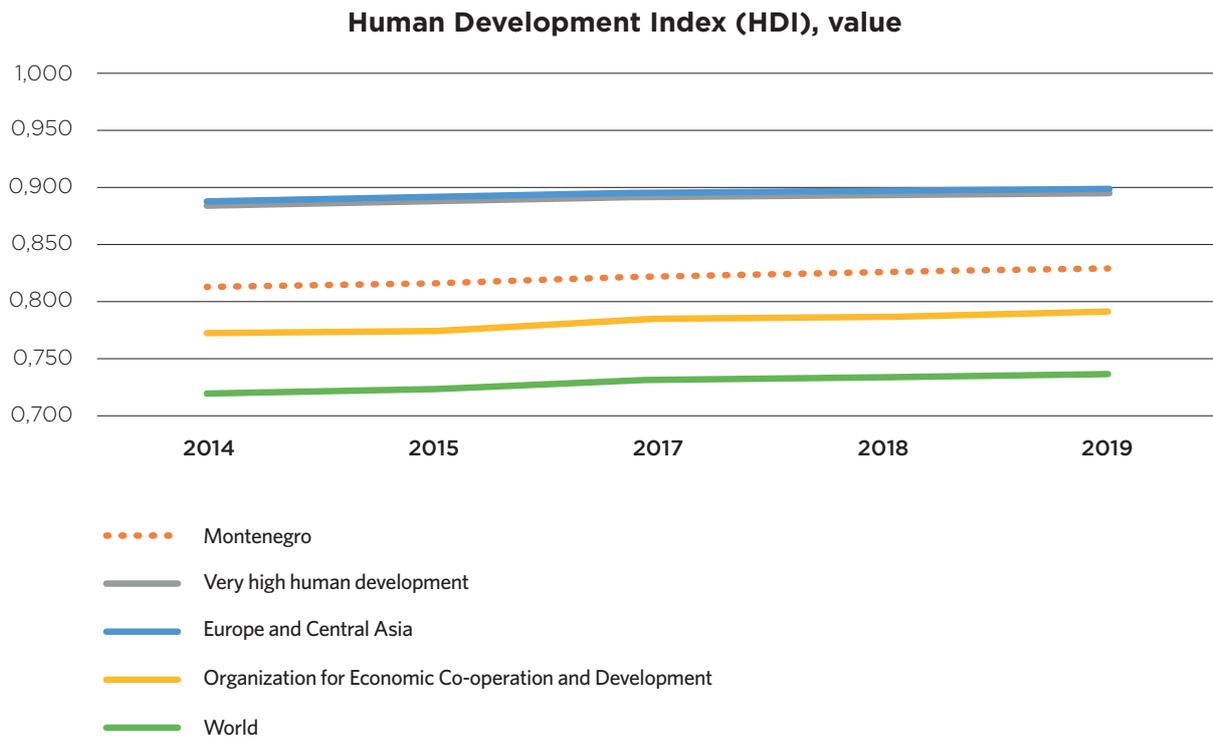
Source: HDI: UNDP, 2019; DAI: World Bank, 2020. The DAI measures countries' digital adoption across three dimensions: people, government, and business. Covering 180 countries on a scale of 0-1, it is the simple average of three sub-indexes: increasing productivity and accelerating broad-based growth for business; expanding opportunities and improving welfare for people; and increasing the efficiency and accountability of service delivery for government.

But new technological disruptions are levying as many new costs as opportunities, requiring interventions to ensure that change does not leave any group behind. A key lesson from the history of technological change is that we must ensure that the major innovations help everyone – regardless of age, sex, income, disability or location.

## Human development ascending – while inequalities persist

Montenegro’s human development outcomes are on the rise. From 2014 to 2019, Montenegro’s human development index (HDI) value improved from 0.813 to 0.829, representing a rise of two ranking places to 48th. But inequalities cause Montenegro’s HDI to drop by 9.7% when adjusted for distribution.

Figure 4 Human development rising in Montenegro – to 2020



Source: UNDP, 2020

As many as one in three jobs in Montenegro are estimated to be in the informal ‘grey’ economy – which lack stability and protections and intensify other forms of discrimination.<sup>1</sup> Women are also overrepresented in the informal economy, at a rate of 16.6% compared to men’s participation at 11.9%.<sup>2</sup> Bringing those in the informal economy into the emerging digital economy will provide a significant driver of human development progress in Montenegro.

## COVID-19 and human development: towards an initial assessment and research agenda

This report also produces for the first time a “COVID-sensitive” estimation of the human development index (HDI) at the national level – bringing together how the pandemic has impacted the economic, health and education dimensions into one statistic to assess human wellbeing.

Aiming to provide insights into how to assess the impacts of and policy response to COVID-19, this report proposes an initial recalibration of the HDI to capture the impact of the pandemic as close to “real time” as available statistics may allow.

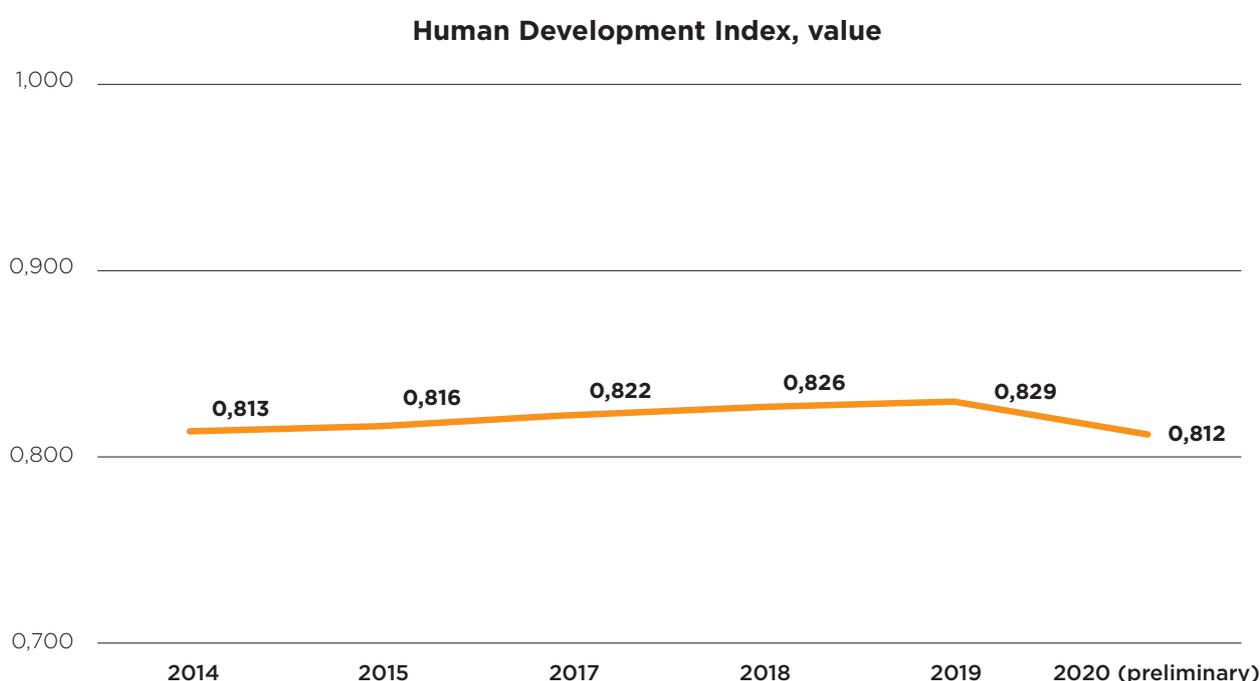
Based on extensive consultations and the formation of a Statistics Panel from Montenegro and international data experts, early estimates show that COVID-19 may cause an overall decline in the HDI for Montenegro never before experienced since the HDI began to be calculated.

### COVID risks reversing more than six years of progress

Based on these calculations, the COVID-sensitive HDI for Montenegro for 2020 can be estimated as 0.812. This represents a decline of 2.13% from the 2019 HDI value of 0.829. COVID risks reversing at least six years of human development progress in Montenegro to levels not seen since 2014.

While preliminary, this work opens up several new avenues for research and evidence-based policymaking to ensure a well-grounded response to COVID-19 which puts human development not only back on track, but makes it deliver for all, leaving no one behind in Montenegro.

Figure 5 More than six years of human development progress at risk



### The changing world of work

While on the rise, the employment rate in Montenegro remains low: at 46%, one in every two people over 15 years of age has no job. To reach the European Union average employment rate – 65% – Montenegro would need to create another 40,000 jobs. Since 2011 about 6,000 new jobs have been created annually, meaning that at this rate it would require 8–9 years for Montenegro to reach the number of jobs required.<sup>3</sup>

How digitalization can lead to inclusive economic transformation and quality jobs will be a key concern as Montenegro responds to the structure of its labour market and addresses the consequences of the COVID-19 pandemic. Digitalization will continue to disrupt various sectors – serving as a driving force in the move from informal to formal work, as well as in the shift from agriculture to industry and services, the largest jobs sector. Indeed, despite being identified as a development priority in Montenegro, agriculture is among the sectors most at risk to automation.

Around the world, automation created by digital transformation will increase the average output per worker by 30% by 2030. However, by the mid-2030s, 30% of jobs and 44% of workers with low skills and education level will be at risk of being replaced by automation. In Montenegro, Accommodation and Food Services for Tourism can see as many as 50% of jobs replaced by technology.

Table 1 Expected impact of automation on Montenegro’s priority sectors by 2030

Priority sector	The corresponding industry according to Bain (2018)	Expected automation percentage until the year 2030
Sustainable Agriculture and Food Value Chain	Agriculture	36
	Accommodation and food services	51
Renewable Energy Sources and Energy Efficiency	Utilities	39
New Materials and Sustainable Technologies	Mining and oil & gas extraction	46
Sustainable and Health Tourism	Accommodation and food services	51
	Healthcare and social assistance	18

Source: WEF, 2018 and Bain, 2018. Projections of increases in gross output per employee in different industries are based on the global data suggested by Bain (2018).

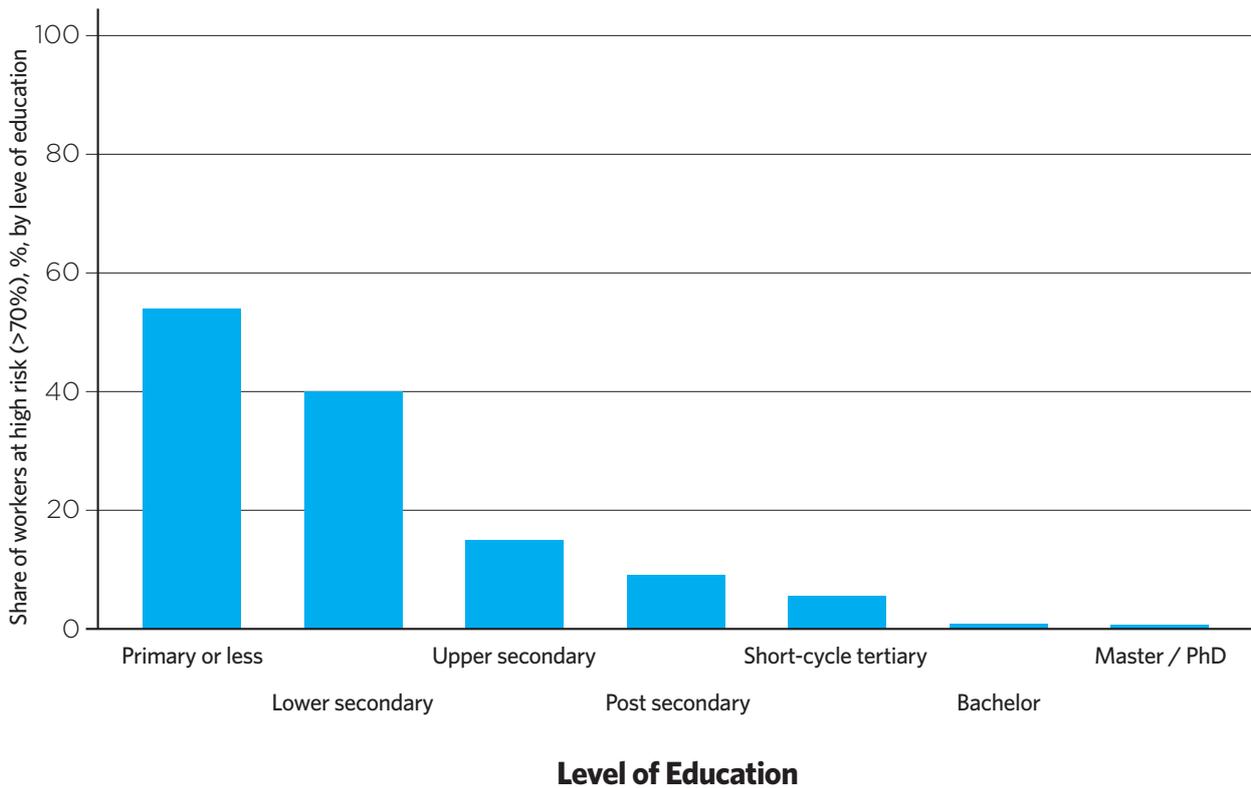
### Managing the economic fallout

Automation will bring new opportunities and costs.

- **Automation will widen income inequalities.** Automation in Montenegro will reshape incomes – widening income inequalities for low-income, low-skilled and uneducated workers. Workers in medium- to low-skill roles which rely on physical labour or skills are also more vulnerable to automation and to losing their jobs.
- **New risks and opportunities for vulnerable groups.** Coupled with already unequal salaries, increasing digitalization may exacerbate the digital divide along gender lines. The inequality in access to technology affects professional and personal development for women because they may not have the same opportunities or resources that are provided for men.

Automatability will be lower for job roles with higher educational requirements, which require cooperation with other employees or where people spend more time influencing others. By contrast, low-skilled individuals face the highest risk of automation.

Figure 6 Workers with lower secondary or lower education levels at highest risk from automation



Source: OECD, 2016.

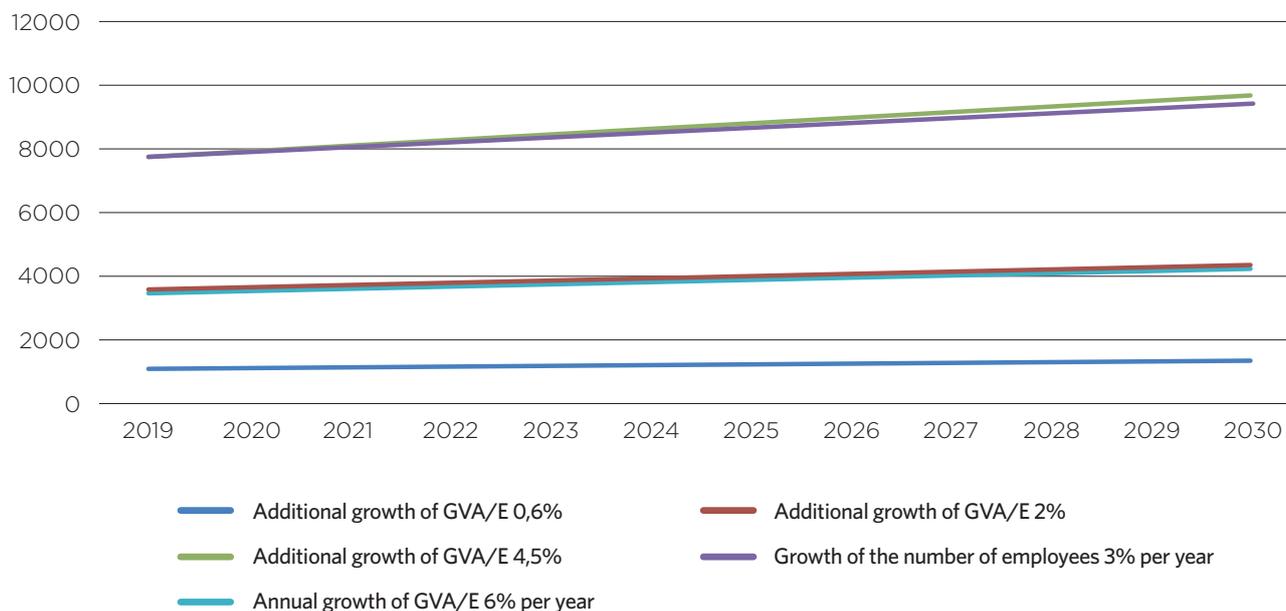
Adoption of new technologies and undertaking the shift to a digital economy stands as a key factor to building resilience to automation: countries investing in digital technologies are better protected.

### Up to 10,000 low-skilled workers must be reskilled annually by 2030

Drawing on global estimates, this report projects for the first time the number of workers at risk of displacement by automation. Depending on various factors, Montenegro should prepare to reskill at least 1,000 and at most 10,000 employees per year, depending on the level of economic growth, demographic changes, including migration, and the rate of automation.

Figure 7 Between 1,000 and 10,000 mostly low-skilled workers must be reskilled annually by 2030

**The numbers of people to be reskilled in Montenegro in case of different scenarios**



Source: Calculated based on MONSTAT, 2019c. See *Technical note: Methodology for creating automation scenarios* for more details.

### Accelerating the digital start-up ecosystem

But there are signs of hope. The digital economy has enabled many women to access work that lets them apply their creativity and potential. Many women have moved to e-trading as entrepreneurs or are employed through crowdworking or e-services.

And start-ups hold significant potential to accelerate digital transformation. Indeed, some of the largest opportunities to orient digital companies towards foreign markets lie in supporting Montenegro’s start-up ecosystems. But a supportive business environment must be built.

### Education and innovation: twin engines for a digital Montenegro

Education underpins human development. But despite strong gains in terms of access to education, the quality of education remains unequal to the task of providing fulfilling opportunities that meet the needs of young people.

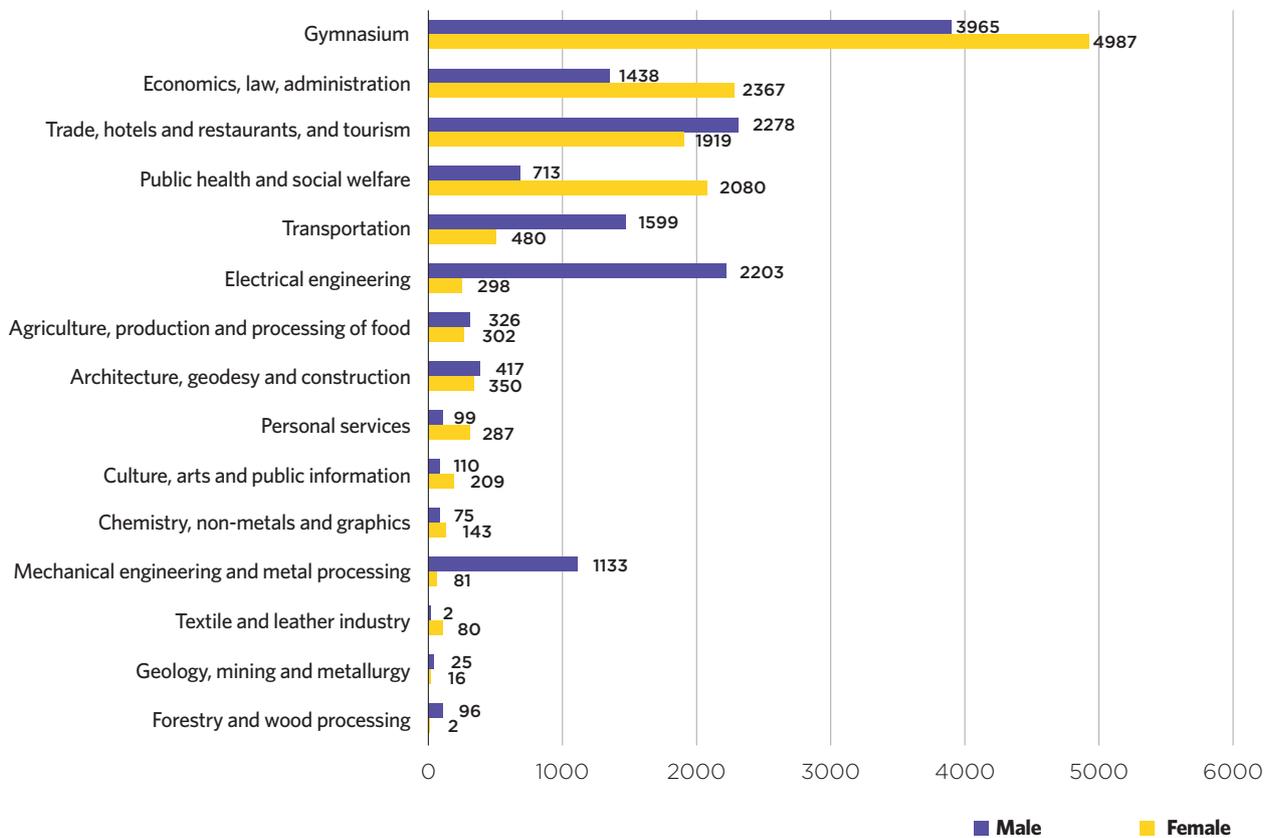
The promise of digitalization in education is immense: digital transformation can help build a new world of opportunity for the people of Montenegro by significantly increasing their competitiveness in the region and beyond. Digital techniques can support teachers, tutors and administrators to improve the quality of learning. And artificial intelligence can provide personalized learning opportunities tailored to individual student needs. But an accelerated pace of research and innovation is needed to deliver on this promise.

## From early childhood to tertiary education

The seeds of creativity, problem-solving and computational thinking can be planted before the age of 16. These should not be underestimated as a powerful force for human development in Montenegro.

But current choices and opportunities require a push in a new direction to meet emerging human development needs and the demands of a digital workforce. Today, vocational education in Montenegro plays a critical role in meeting the needs of the labour market and lifelong learning, with 31.3% of students studying in a gymnasium. Among these, 15.4% choose vocational education in the fields of trade, hotels and catering, and tourism, while 13.3% study economics, law and administration. Those studying other fields make up 40%. Tourism stands out as a core economic area and public administration as one of the most popular sectors among employees in Montenegro.

Figure 8 Fields of study at gymnasiums and vocational schools



But these are precisely the sectors most at risk of automation due to the emergence of automated hotels, increasing use of robots in mowing grass, cleaning, food processing, and so on. A process to reprioritize new vocational education programmes to prepare students for new, emerging sectors is critical.

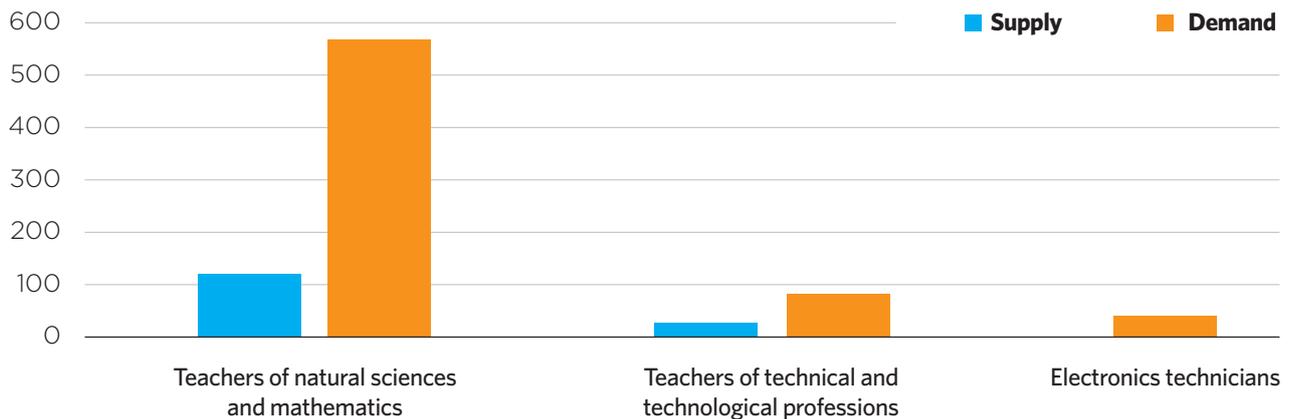
Making the primary and secondary school curricula more responsive to the needs of a digital economy can help Montenegro develop digital skills during the earliest stages of schooling, to be later upgraded through secondary education, and specific qualifications could be gained during tertiary education. And given the scope for Montenegro's young people to improve in mathematics, science and reading performance, digital tools can support the learning system more broadly.

A redesign of the curricula of higher education to align it with the real and prospective needs of Montenegro’s emerging digital economy stands out as an urgent need.

### Supply and demand gap

In 2019, demand outstripped supply in in many science, technology, engineering and mathematics-related studies: with only 123 teachers of natural sciences and mathematics available for 566 openings.

Figure 9 Gap between supply and demand across occupational groups in 2019



Source: Based on EAM, 2020

### Cultivating new digital-era skills

Computational thinking is one kind of analytical thinking essential for digital transformation. The equipping of young people with these skills spans across all levels of the education system – primary, secondary, vocational and tertiary. They start with teaching schoolchildren how to programme in code and robotics clubs, regardless of their future professional choices.

### Making e-governance work for all

Effective e-governance structures are fundamental for ensuring that digital transformation yields human development dividends for all. But what policy and institutional arrangements must be prioritized to promote inclusive digitalization in Montenegro?

Multiple dynamics come into focus: from taxation and data regulation to voice, connectivity and citizen power facilitated by technology and the best practices on how to build an inclusive digital state. Key challenges of data privacy (the new ‘oil’), human bias replicated in technology, and questions of how to tax robots, digital businesses and activities must be addressed.

Electronic tools can significantly support the engagement and voice of citizens, civil society and businesses. To provide conditions for this, strengthening the e-government portal as a central point for user-friendly access to information and public administration services over the internet for citizens and businesses is a key step in this process.

## Realizing Montenegro's digital future

Digital transformation could drive the economy of Montenegro for decades. Looking beyond short-term losses or groups that may be initially disadvantaged will be critical.

To make a digital Montenegro a reality, action will be required on six fronts.

- **Mastering digital skills.** Better informing and educating the people of Montenegro about the benefits of using and mastering digital technology is step 1. Teaching problem-solving and computational thinking in primary school and critical thinking across all education levels will be the foundation for this.
- **Expanding digital infrastructure.** A priority for advancing digital infrastructure is the viewing of ICT as an enabling force for economic growth and human development.
- **Strengthening the business, start-up and ICT ecosystem.** Growing digital business would significantly strengthen the opportunities for digital transformation from within Montenegro – simplifying the process for registering a company online and digitally managing e-commerce, taxation and other areas related to running a company will improve the overall business environment and increase tax revenue.
- **Incentivizing innovation for digital transformation.** Creating a strategy and a clear action plan to grow Montenegro's research and development spending will strengthen the business environment and pave the way for digital innovation.
- **Transitioning to public administration e-services.** Implementation of a comprehensive Public Service Portfolio Management (PSPM) system. This tool will add significant value to the information society for public service development.
- **Establishing a coordination body for the development of digital solutions.** Creating a unified and coordinated leadership position can serve to consolidate Montenegro's digital pathways forward.

## An engine for human development and fighting COVID-19

Montenegro has seen rapid economic growth and expansion in access to education, which have spurred the progress of human development. With digital transformation, greater opportunities will arise to invest in human development. But this will mean taking full advantage of Montenegro's digital landscape through determined, focused interventions. This requires a new perspective: the digital economy in Montenegro should serve the country's people, rather than the other way around.

# Chapter 1

## Human development and digital transformation in Montenegro

By the end of 2019, about half of the world's population was connected to the internet – just 30 years after the invention of the World Wide Web. As was the case with water, electricity and information technology before – the digital revolution will soon shape the future of global and national GDP, yet only a minority of people believe that technology will make their lives better. Expansion of digital access is slowing, and digital patterns often entrench economic, gender and social divides. While digital technology has the potential to transform societies into a new era of sustainable development, policies and strategies must place people at their centre to outweigh the risks of digital, social and economic exclusion, concentration of power and wealth, and social instability.

Montenegro stands on the verge of a digital tomorrow. Digital technology holds the potential to revolutionize every sector in society – from how we access information and entertainment, to how businesses solve problems, and how the government supports economic, social and environmental progress. Yet an uncontrolled policy for digitalization would create multiple fractures of a digital divide – along lines of gender, income, rural/urban gaps, disability and age, among other dimensions, which could deepen and entrench the existing inequalities. Establishment of the kind of digital transformation that maximizes human development outcomes is needed. This report provides the basis for analysing Montenegro's digital transformation for such an outcome.

Human development is about the expansion of human choice that which we each have reason to value being or doing. What people choose to be or do is often enabled by income and wealth, but it goes far beyond these. Digital transformation gives rise to specific impacts on human development – just as expansion in our knowledge and innovation can expand digital transformation. This report unpacks this close interrelationship in order to lay out an agenda for harnessing digital transformation not only for the valuable goals of economic growth or aligning policies with economic communities, but also to maximize its role in fulfilling human potential in Montenegro. Indeed, system-wide disruptors, such as the COVID-19 outbreak, continue to threaten the gains made in human development. The United Nations Development Programme (UNDP) has recently modelled the first-ever decline in the human development index (HDI), which measures the average progress in improving standard of living, education and health indicators.<sup>1</sup> COVID-19 has all too clearly shown how important digital access is: in many cases only those with access to the internet can continue their work, education and participation in community and political life.

In uncertain times, it is essential that Montenegro builds the necessary resilience to operate in this new reality. While this report does not take its theme as a panacea to all social, economic and environmental challenges, the COVID-19 pandemic has showcased the value of IT and digital transformation and how governments should accelerate the transition. Where long-term collaborative work is necessary – whether in government or business – where identification of new human solutions, such as the COVID-19 vaccine, remains, or where the diffusion of new ways of working and interacting together must emerge, digital transformation provides part of the response we need.

Digital transformation provides a unique, powerful entry point to reduce vulnerability and strengthen the resilience of Montenegro's society. But the benefits of and access to digital transformation must be shared widely and inclusively by all.

## Digital transformation in Montenegro is under way – but digital access, skills and confidence remain fractured

One of the core measures of digitalization is access to the internet – which serves as a major driver of change in everyday activities, in the way businesses, government and organizations conduct their work, and in access to public administration e-services. But digital transformation goes beyond internet access to encompass a wide range of digital and technological advances taking place around the world (Box 1.1).

### Box 1.1 Defining digital transformation

Digital transformation is the use of new, fast and frequently changing digital technology to solve social, economic and environment problems. It represents a profound transformation of business and organizational activities, processes, competencies and models to fully leverage the changes and opportunities of a mix of digital technologies and their accelerating impact across society in a strategic and prioritized way.

While digital transformation is predominantly used in a business context, it also impacts other dimensions of society including government, public-sector agencies and organizations involved in addressing social challenges, such as pollution and ageing populations, by leveraging one or more of these existing and emerging technologies.

Three factors define the difference between digital transformation as compared to other significant drivers of technological change.

- **Velocity:** Current breakthroughs in digital technology are occurring at unprecedented speeds. Previous industrial revolutions gathered pace linearly. The current technological shift is progressing exponentially.
- **Scope:** The range of changes is disrupting every sector around the world. While some sectors such as businesses and technology companies themselves are leading the way, governments and even NGOs and civil society are catching up as technologies revolutionize their ability to serve communities and the vulnerable.
- **Systems:** The depth of impact of digital technology is causing changes in our systems of production, management and governance – but transformation in these same systems is needed to leverage the potential of the digital revolution for human development.

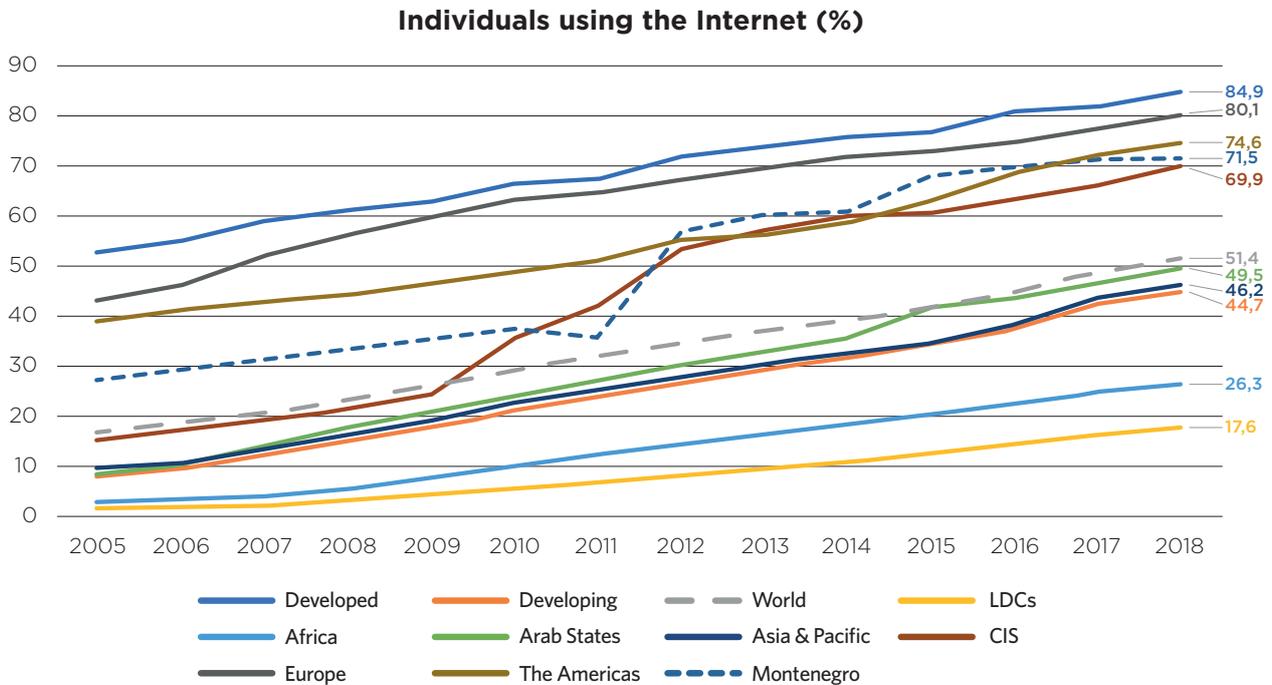
Multiple factors are covered by digital technology, ranging from **artificial intelligence** or the ability of machines to respond to stimulation consistent with traditional response from humans, given the human capacity for contemplation, judgment, and intention; to **automation**, the full or partial replacement of human work with work performed by machines; and other **emerging technologies** such as: blockchain, the Internet of Things and precision medicine, to name a few.

Digital transformation is ushering in an age in which scientific and technological breakthroughs are disrupting industries, blurring geographical divides, challenging existing governance frameworks and redefining human capabilities.

Source: Digital Transformation, 2018; Brookings, 2020

Well above the global average (53.6%), 71.5% in Montenegro have access to the internet, whether at home or outside it (Figure 1.1). Among those who use the internet, the frequency of use is high: 87.9% of those who use the internet use it daily or almost every day, and 10.7% of people use the internet at least once a week. While recent progress has been made, Montenegro still stands below European trends (80.1%) and those for all developed countries (84.9%) – underscoring the fact that there is scope for more progress.

Figure 1.1 Internet access on the rise – everywhere



Source: ITU, 2020

Box 1.2 Progress on Sustainable Development Goals digital indicators

The 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs) sets out 17 goals, 169 targets and 232 indicators to monitor economic, social and environmental progress up to 2030.

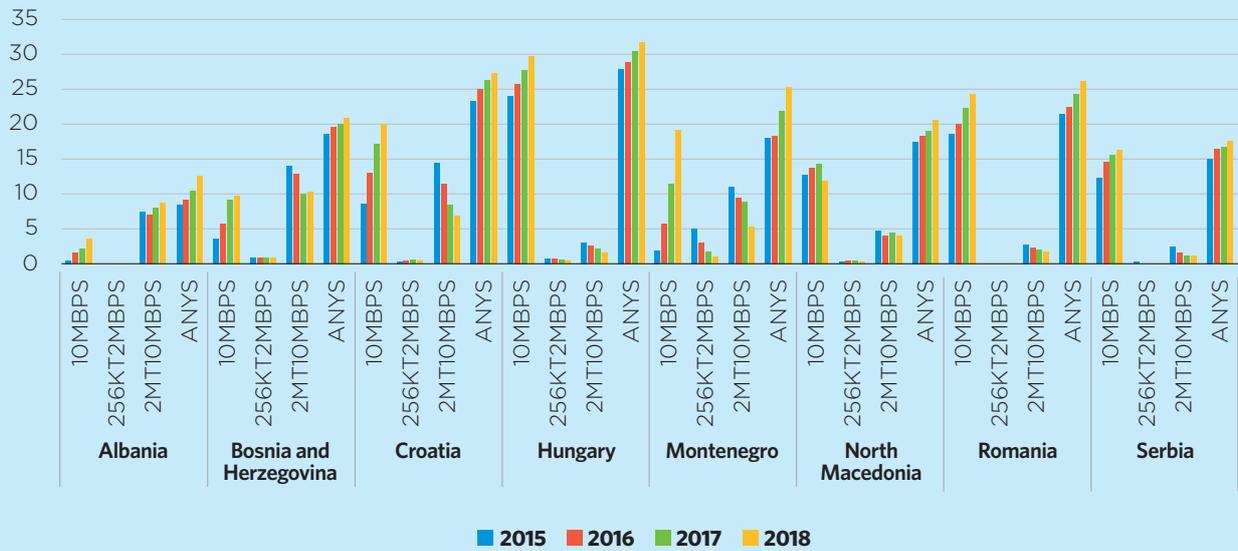
Among these are four indicators relevant to digital transformation:

- 9.c.1 Proportion of the population covered by a mobile network, by technology
- 17.6.2 Fixed internet broadband subscriptions per 100 inhabitants, by speed
- 17.8.1 Proportion of individuals using the internet

How does Montenegro fare on these indicators?

Regarding the proportion of population covered by 2G and 3G mobile networks, Montenegro stands at over 98%. While the share of Montenegro people connected to 4G was below that of neighbouring countries in 2012 (10% compared to as high as 54% in Romania), Montenegro saw the fastest rate in connecting people to 4G: reaching 98% in 2018. The numbers of people connected to faster fixed internet broadband subscriptions is rising in Montenegro and its neighbours. In Montenegro, those with subscriptions of up to 10 Megabytes per second (MBPS) rose from 1.9 per 100 inhabitants in 2015 to 19.1 in 2018 – connecting people at the fastest rate among the country’s neighbours.

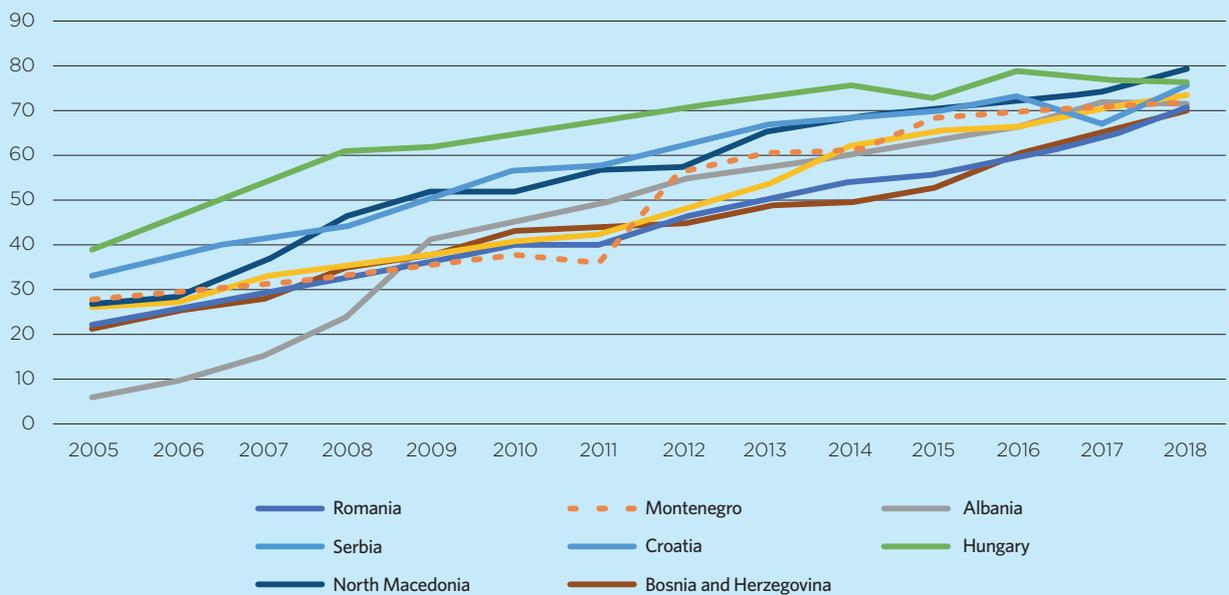
### Fixed internet broadband subscriptions per 100 inhabitants, by speed (per 100 inhabitants)



Note: Equal to or above 10 Mbit/s subscriptions refers to all fixed-broadband internet subscriptions with advertised downstream speeds equal to, or greater than, 10 Mbit/s; 2 Mbit/s to less than 10 Mbit/s subscriptions refers to all fixed-broadband internet subscriptions with advertised downstream speeds equal to or greater than 2 Mbit/s and less than 10 Mbit/s; 256 kbit/s to less than 2 Mbit/s subscriptions refers to all fixed broadband internet subscriptions with advertised downstream speeds equal to, or greater than, 256 kbit/s and less than 2 Mbit/s; ANYS refers to any speed available.

Regarding internet users, Montenegro stands marginally below several neighbours – at 71.5 internet users per 100 people in 2018 compared to 79.2 in Serbia.

### Internet users per 100 inhabitants



Source: UN Statistics Division, 2020

Two major sources of data exist on internet connectivity. One is based on an annual household survey on ICT usage survey based on Eurostat methodology. This survey covers households with at least one member aged between 16 and 74 years. In 2019, 74.3% of households reported having broadband internet access.<sup>2</sup> But the other source of connectivity, developed by the Montenegro Agency for Electronic Communications and Postal Services (EKIP), looks at the actual number of connections. On this measure, 91.2% of Montenegro’s households had an active connection for broadband internet access as of June 2020. Additionally, next-generation access (NGA) networks were technically available to approximately 80% of households.<sup>39</sup>

But digital access is unevenly distributed in Montenegro. According to a household survey, access in rural areas is just 62.8%, compared to 80% in urban areas. Moreover, a deep divide exists between the north and south of the country. Internet access in the north is only 64.8%, while the Internet access in the south, including the area of the capital city, is 79.2%. And one in five people in Montenegro do not use the internet at all.<sup>2</sup>

Social divides also persist in digital access. Young people aged 16–24 report using the internet every day or almost every day at the largest rate, at 99.6%, while just 72.8% of those above 65 years old do so (Table 1.1).

Women also tend to use the internet daily or near daily slightly more than men, at 88.5% compared to 87.4% among men. This finding contradicts common conclusions that men use the internet slightly more than women.<sup>35</sup> But another marker of social divide better determines the nature of gender-based use: the type and number of activities on the internet for both genders largely depends upon the income level and educational attainment.<sup>36</sup> More educated men use the internet for professional activities, while less educated men use the internet mainly for entertainment and sports. On the other hand, more educated women have a wider range of activities, while less educated women use the internet mainly for social networking.

In general, the findings indicate that Montenegro’s women have succeeded in overcoming the traditional stereotype on gender differences and have, especially in the lower-education category, outperformed men in their willingness to master and use new technologies.<sup>36</sup>

Table 1.1 Young people – and women – use the internet more often (in %)

Internet Usage	Age						Gender		Total
	16-24	25-34	35-44	45-54	55-64	65-75	Male	Female	
Every day or almost every day	99.6	96.3	88.6	79.6	77.9	72.8	87.4	88.5	87.9
At least once a week	0.4	3.7	10.3	17.3	21.0	20.1	11.7	9.3	10.7
Less than once a week	0.0	0.0	1.1	3.1	1.1	7.1	0.9	2.2	1.4

Source: MONSTAT, 2019m

Digital access in Montenegro is correlated to income. Only 41.8% of households with an income of up to €300 per month have access to the internet, in comparison to 97% of households with incomes of over €600 per month.<sup>3</sup> Low-income earners also access the internet at a prevalence 55.2 percentage points lower than high-income earners.

Education also serves as a marker defining digital access. Among Montenegro people with lower education levels, 27% had a high level of skills of using the internet, while this indicator was 32% for people with secondary education and 54% for people with higher education.

The largest digital divides in Montenegro remain delineated by location. Access in rural areas is 17.2% lower than in urban areas, and in the north 14.4% lower than in the south of the country. As the northern part of the country is overall more rural and poorer compared to the south, digital access is divided along the north–south axis of Montenegro.

Data also indicates a potential stagnation in connecting more people in Montenegro to the internet in recent years – highlighting that the low-hanging opportunities might have already been seized. This points to the need to expand internet access more broadly and to reach those currently left out.

Montenegro has seen among the most dynamic growth in telecommunications infrastructures in the region and beyond. Over the last four years, broadband penetration has increased from 53% to 91% – and the availability of next-generation access connections has increased from 26% to 80%. Additionally, Montenegro proactively applied for and obtained a World Bank grant to prepare technical documentation and a feasibility study to extend broadband access to rural areas where no commercial interest in investing existed. Implementation started in September 2020.<sup>40</sup>

### How do people in Montenegro use their digital access on a daily basis?

Of those with access to the internet, most people in Montenegro use their digital access to connect with each other:

- 84.6% participate in social networks;
- 84.0% telephone or perform video calls over the internet;
- 75.7% read online news and magazines;
- 70.5% report sending and receiving e-mails.<sup>4</sup>

In short, in terms of everyday use, people in Montenegro are using the internet to access information about their country or from around the world. But how are digital skills evolving for the private sector?

### Digital skills remain inadequate for business needs

Computers are nearly ubiquitous across Montenegro’s businesses: 98.5% report the use of computers in their activities, with 99.2% of businesses using computers with access to the internet. While 80% of businesses have dedicated websites, just 55% are linked to social media profiles. The majority of businesses access Internet in Montenegro via digital subscriber line (DSL) or other fixed broadband connection.<sup>5</sup>

While digital technology is clearly critical for Montenegro companies, few believe that their staff possess the requisite skills. Fewer than one in three information technology (IT) company representatives reported that employees with jobs where digital skills were needed had adequate skills to undertake their work. And just 19% rated the digital skills of their employees as very good.

Outside of the IT sector, only 54% of companies estimate that their employees have a sufficient level of digital skills to efficiently carry out their work. In enterprises rating the state of digitalization as below optimal, the level of employee digital skills was rated even lower – only 38% believed their staff had the level of digital skills enabling them to perform their jobs efficiently.<sup>6</sup>

Among currently employed people in Montenegro, 11% reported being forced to change jobs, losing their job, not getting a job, or quitting employment due to inadequate digital skills.<sup>7</sup> Despite this, just 27% express an interest in acquiring or upgrading their digital skills that would enable them to become more competitive in the labour market or to make a better use of the internet in their everyday lives.<sup>8</sup>

The interest in improving digital skills to gain competitiveness in the labour market is lowest among the least educated citizens: 60% of the least educated state that they lack any interest in improving their digital skills. Moreover, interest is very low among unskilled workers. This contrasts significantly with employer perspectives: 46% of managers were interested in improving their digital skills.<sup>9</sup>

### Low confidence in public administration e-services

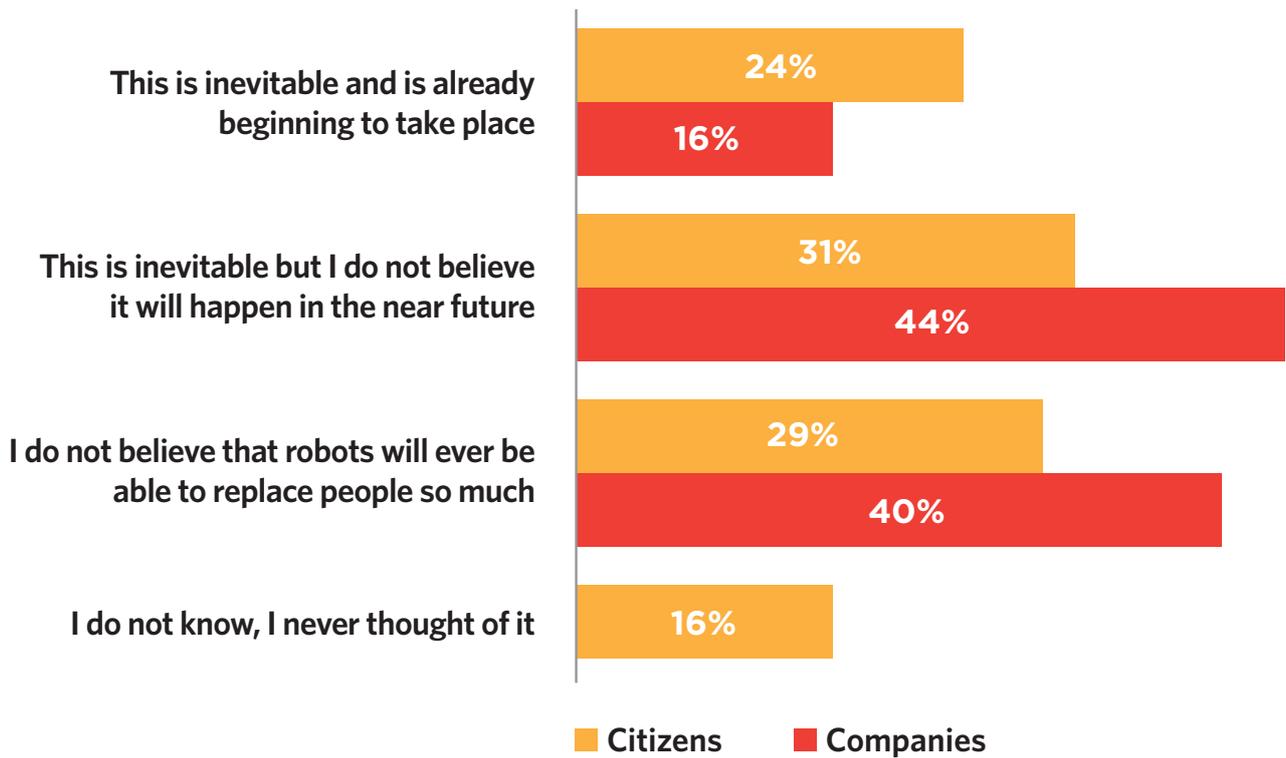
While people in Montenegro are already using digital technology on an everyday basis and businesses see a new digital future emerging, the situation shifts profoundly when it comes to leveraging digital technology for accessing e-services. Over 69% report not once purchasing goods or services over the internet. The internet is rarely used for banking services, shopping or tourist reservations. And even more rarely used to access public services online: just 5% of people in Montenegro report performing public-administration-related e-services.<sup>32</sup> This fact concurs with the data published in the United Nations E-Government Survey 2020<sup>33</sup>, where it is stated that Montenegro is one of the countries where infrastructure and human capital development are more advanced than online service provision. According to the report<sup>34</sup>, this is reflected for Montenegro by the value 0.5412 for the online service index, contrasting with the value of 0.7366 for the telecommunications infrastructure index and a value of 0.8239 for the human capital index.

The limited use of digital access beyond everyday communication and information points to a salient issue: a low level of trust among Montenegro people in e-commerce and e-services. With the digital infrastructure in place – from the ability to make online purchases in Montenegro to the market for buying products from around the world online – the foundations for e-commerce are ready to be laid.

### Perceptions on risks of digitalization differ by occupation and education

A key challenge across Montenegrin society are the perceived risks of digitalization. More than half of people in Montenegro aged 18–65 believe that accelerated technological development will inevitably replace jobs with robots and computers (Figure 1.2). While a third remain optimistic that this will happen only in the distant future and another 29% believe robots will never replace people, one in four are already feeling the consequences.<sup>10</sup> This is largely similar to sentiments across the European Union, where between 45% and 60% of all workers see themselves being replaced by automation by 2030.<sup>11</sup>

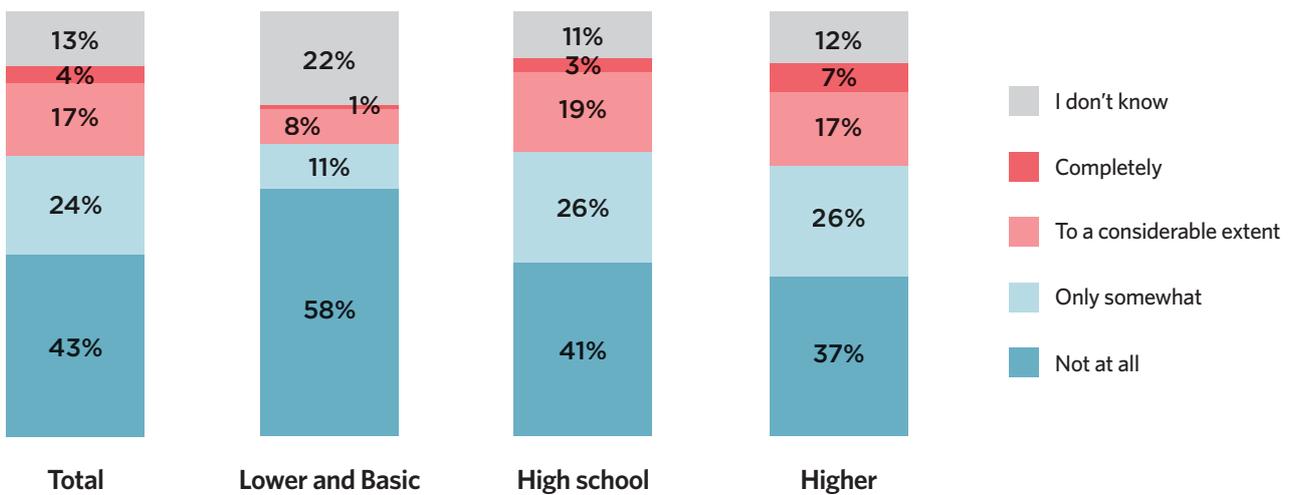
Figure 1.2 Will robots replace people?



Source: Ipsos, 2018

Perspectives vary by level of education: the higher educated worry more about their job prospects in the face of the digital revolution. While 50% with tertiary education or higher are concerned that robots could replace people in their professions, just 20% of those with primary education are concerned (Figure 1.3). Among citizens with primary education, the belief dominates that robots cannot replace people in their profession – at all.

Figure 1.3 Fear that robots will replace people in their professions is low – but differs by level of education

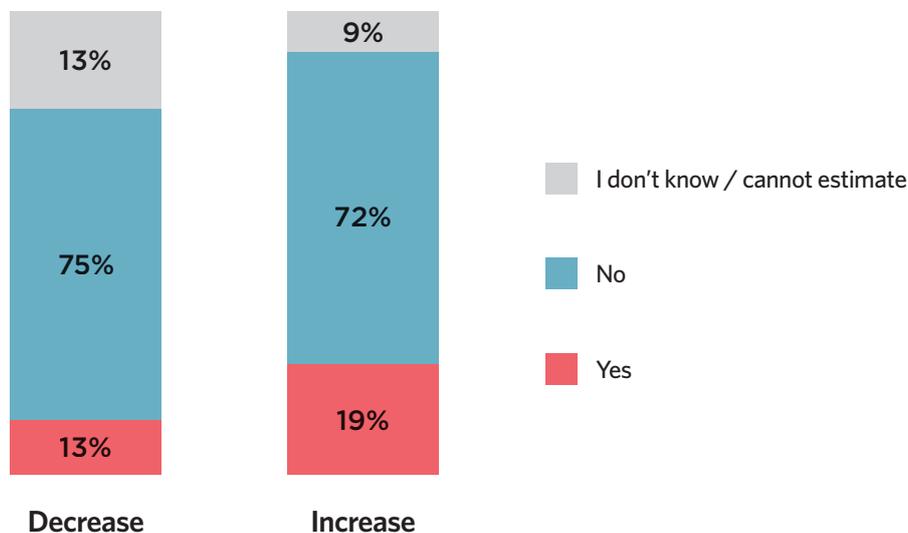


Source: Ipsos, 2018

Only a small percentage of businesspeople believe that the increasing automation and usage of ICT will affect the need for staff in their company. Only four out of the 32 surveyed company representatives (13%) believe that in the next 5–10 years, the increasing automation and usage of ICT will reduce the need for certain kinds of staff currently employed by their company (Figure 1.4). Companies expecting a reduction in the need for some staff categories mention accounting and administrative work, and companies expecting an increase in the need for new staff categories mention ICT professionals, who will create and maintain the specific programs needed for the functioning of the company.<sup>12</sup>

Only six company representatives (19%) estimate that the increasing usage of ICT in the next 5–10 years will lead to the creation of new jobs in their company. On the other hand, five company representatives (16%) believe that the automation and usage of ICT have already influenced the creation of new jobs in their company and have increased the need for certain kinds of staff.

Figure 1.4 ICT businesses do not expect an increasing impact of automation on staff



Source: Ipsos, 2018

Overall, the foundations for a digital revolution in Montenegro exist. While people and businesses hold varying levels of consideration of the risks of digital change, this report argues that there is opportunity for leveraging digital technology to raise living standards, advance knowledge and improve the health of the people of Montenegro across the country.

## Human development and digital access: a virtuous cycle

Throughout history, technological innovation has driven improvements in living standards and human wellbeing. With the proliferation of digital technologies today, what will be the impact of future changes and how will the gains from innovation be distributed across groups?

Digital transformation poses new challenges to labour markets, but also new opportunities for growth. A key lesson from the history of technological change is that we must ensure that major innovations help everyone – regardless of age, gender, income, disability or location. As the 2019 global *Human Development Report* argues: we must shape technology for our societies, and not allow technology to shape our societies.<sup>13</sup> This will require innovative policies, institutions and transformations that ensure inclusiveness and equity.

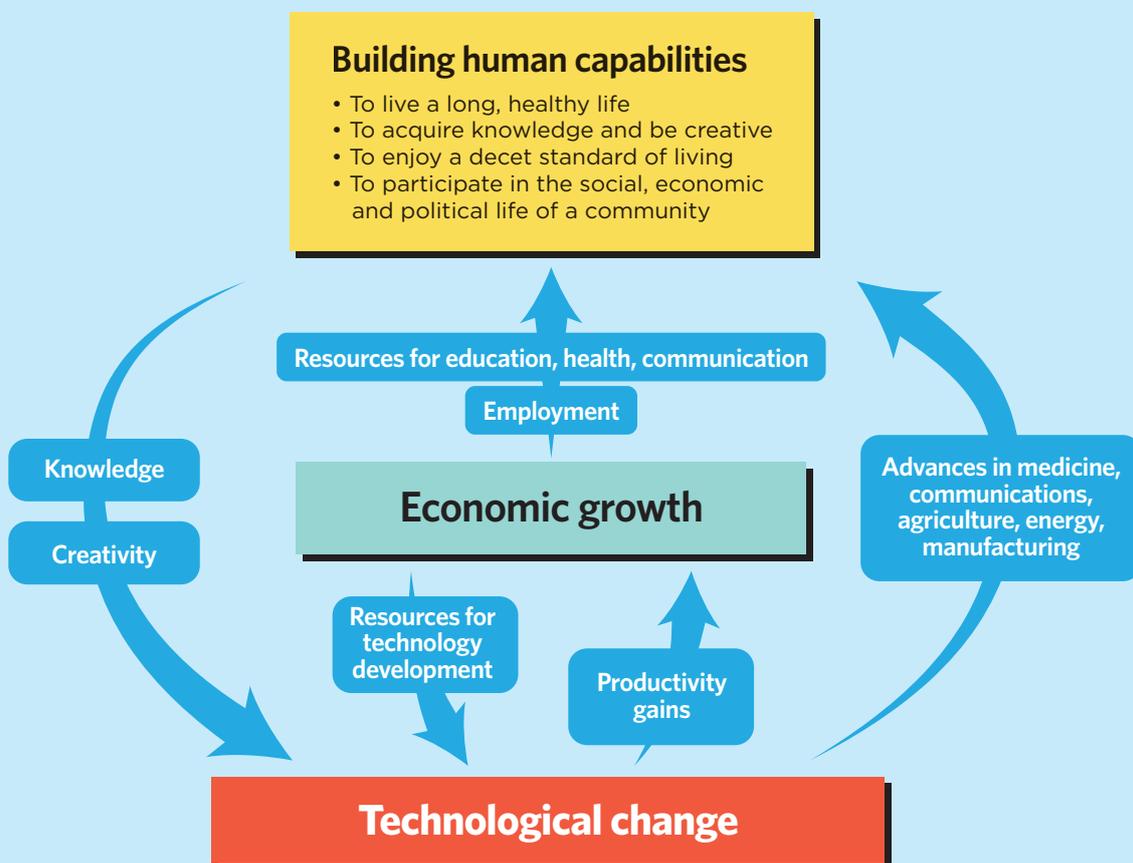
Technological change goes hand in hand with human development progress in a range of dimensions. A significant tradition exists within the *Human Development Reports* of analysing human development and technology. It looks at a two-way relationship between human capabilities and technological change – mediated through economic growth, knowledge and innovation (Box 1.3).

Box 1.3 Human development and technological change

The 2001 global *Human Development Report* focused on the theme of how people can create and use technology to improve their lives. Nearly 20 years ago, the report reviewed how new technologies might widen the already entrenched inequalities between north and south, rich and poor, rather than serving to lift all boats equally. Without innovative public policies, these technologies could become sources of exclusion, not tools of progress. The needs of poor people could remain neglected and new global risks be left unmanaged. But managed well, the rewards could be greater than the risks.

The report proposed a framework to understand the links between technology and human development, establishing a two-way relationship. First, technological innovation can directly enhance human capabilities – whether through smart climate technologies, vaccines, the internet or clean energy, it can directly improve people’s health, nutrition, knowledge and living standards.

Secondly, technological innovation can serve as a *means* to human development because of its impact on economic growth through productivity gains. By raising farmer crop yields, connecting young people to employment opportunities, enhancing factory worker output or the efficiency of doing business in or across societies, technological innovation contributes to economic growth and employment generation.



But human development is also a critical means towards generating technological development. As an expression of human potential, the 2001 report argues, higher levels of education make powerful contributions to technology creation, use and diffusion. In effect, human development and technological advance are mutually reinforcing, creating a virtuous cycle of impacts and interrelationships.

This 2020 Montenegro *Human Development Report* builds on this tradition by furthering understanding of the relationship between human development and digital transformation as a specific form of technological change. It takes as foundation that there is a two-way interrelationship – and interrogates more closely how to leverage digital transformation through jobs, knowledge and innovation, and public administration e-services.

Source: UNDP, 2001

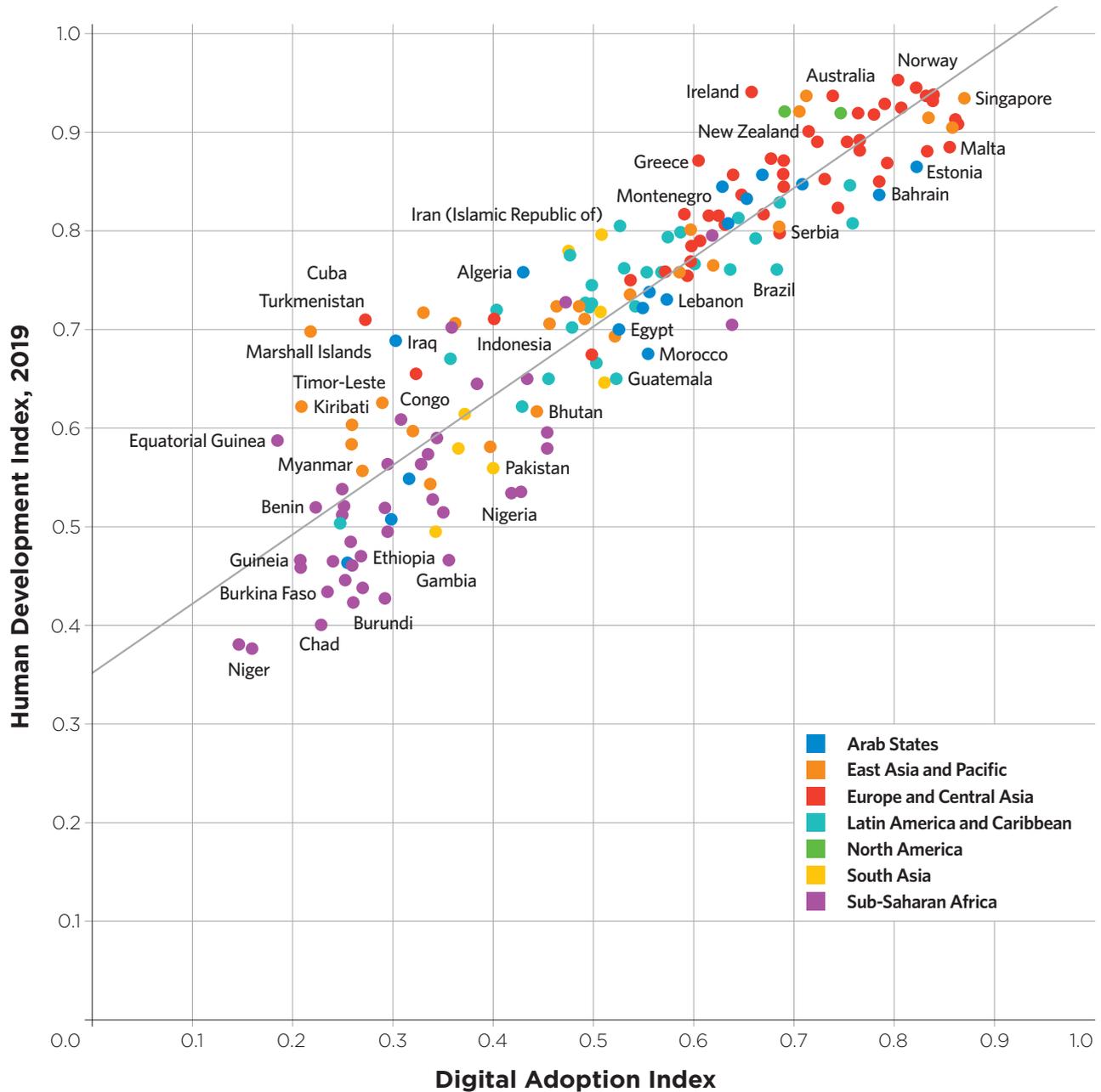
One measure to capture the key dimensions of digitalization was developed by the World Bank, in its 2016 World Development Report, *Digital Dividend*. This measure is the digital adoption index (DAI). The DAI is a worldwide index that measures countries' digital adoption across three dimensions of society: people, government and business. This formation was derived from the report's analysis, leading to three policy objectives:

- A business environment where firms can leverage digital technology to compete and innovate for the benefit of consumers.
- A 'people' objective – where workers, entrepreneurs, and public servants have the right skills to take advantage of opportunities in the digital world.
- An accountable government that effectively uses digital technology to empower its citizens and deliver services.<sup>14</sup>

As the World Bank report concludes: "What these priorities highlight is that core elements of the development agenda – business regulations that ease market entry, education and training systems that deliver the skills that firms seek, and capable and accountable institutions – are becoming more important with the spread of the internet."<sup>15</sup>

What are the interrelationships between human development and such a perspective on digital adoption? Using global data at the country level, we can map this based on the human development index and the digital adoption index (Figure 1.5).

Figure 1.5 Links between human development and digital adoption, world



Source: HDI: UNDP, 2019; DAI: World Bank, 2020. The DAI measures countries' digital adoption across three dimensions: people, government, and business. Covering 180 countries on a scale between 0 and 1, it is the simple average of three sub-indexes: increasing productivity and accelerating broad-based growth for business; expanding opportunities and improving welfare for people; and increasing the efficiency and accountability of service delivery for government.

While there is a strong correlation between the DAI and the HDI, the relationship is not automatic. For any given level of DAI, a wide diversity of HDI values exists for countries. For example, while they have similar values for the DAI, Cuba and Chad have very different levels of human development. And within the Eastern Europe and Central Asia region, there is a wide range in both the HDI and DAI. However, at high levels of HDI, there is a pattern of convergence: the greater the rate of digital adoption, the higher the levels of HDI. Moreover, the interrelationships are likely two-way and mutually reinforcing.

Broad patterns point to the rapid spread of digital technologies in much of the world. However, the broader development benefits from using these technologies have lagged behind digital

trends, producing a mixed picture for human development. While digital technologies boost growth, expand opportunities, and improve service delivery, their impact is unevenly distributed – creating digital divides across people, space and time.

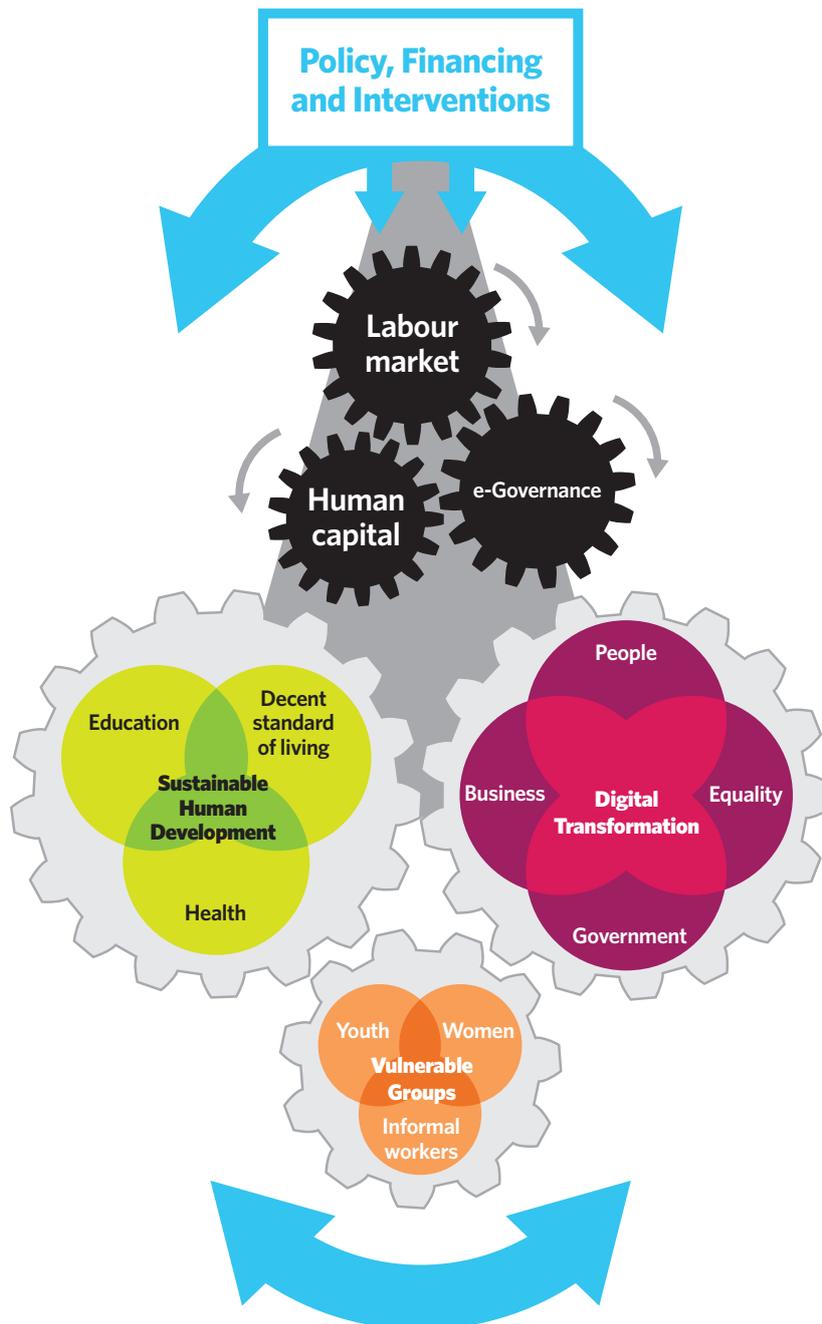
For digital technologies to benefit everyone everywhere, the remaining digital divide needs to be closed. And while greater digital adoption is necessary, it remains insufficient.

To reap the potential of the digital transformation, countries need to strengthen policies that:

- ensure competition and a level playing field among **businesses**;
- accelerate adaptation of **peoples’** skills to the demands of the new economy; and
- ensure that institutions of **government** are transparent and accountable;
- and throughout, to ensure **equality** of access and opportunity for people to enhance IT literacy and to transform analogue companies into digital ones.

This framing informs the proposed conceptual framework for this report (Figure 1.6).

Figure 1.6 Human development and digital transformation: leaving no one behind



The conceptual framework highlights the existing and potential interrelationships between human development and inclusive digitalization transformation. At the heart of the framework is the important role of policy, financing and interventions to spur positive feedback loops between digitalization and human development, and to minimize negative effects.

Acute inequalities are felt, especially those perpetuated among and across vulnerable groups such as young people, the elderly, and informal-sector workers excluded from progress in both human development and digital transformation. Policies, financing and other interventions are also critical to ensuring that the pathways of digital transformation can result in improvements in human development through the pathways of education and health, creating decent work and ensuring inclusiveness to leave no-one behind.

Similarly, policies, financing and interventions are needed to strengthen human development outcomes that can reinforce inclusive digitalization: through better education, innovation and building on an adequate standard of living and health. The framework emphasizes that policies, financing and intervention are needed to strengthen the pathways through which digitalization advances human development – especially for vulnerable groups.

The interaction between digitalization and human development happens through the process of realizing economic growth, which may or may not lead to human development. Economic growth contributes to human development if it: is sustainable economically, socially and environmentally; is accompanied by greater participation, empowerment and democracy; and brings about secure livelihoods through the creation of quality work. Critical to this is ensuring equity especially for vulnerable groups.

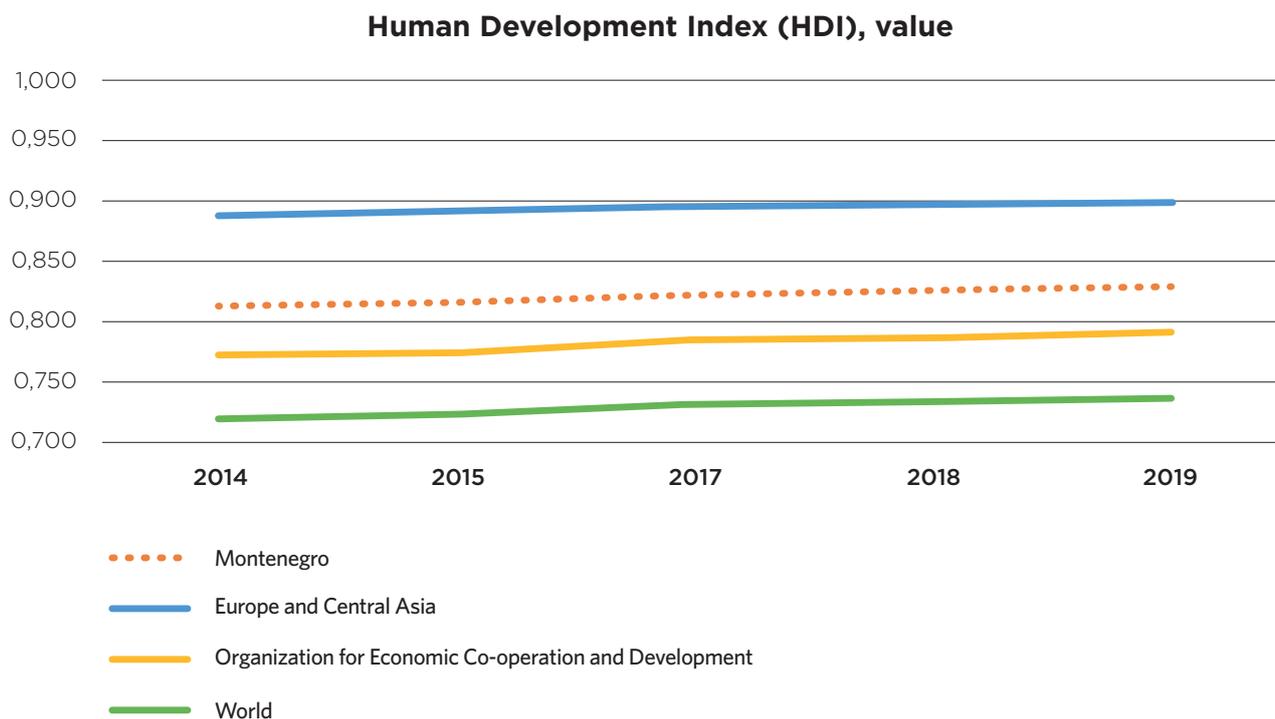
This framework details multiple opportunities and risks in human development and digital transformation. The direction of these pathways, however, depends on the status and trends of multiple basic and advanced human capabilities in Montenegro.

## Human development rising – while inequalities persist

The human development index (HDI) serves as a summary tool to grasp the average level of achievements in education, health and income made by a country. Rated on a scale between 0 and 1, it shows not only how countries are faring relative to one another, but also which dimensions are driving human progress.

Overall, Montenegro's human development prospects have seen a positive upward trend. Between 2014 and 2019, Montenegro's HDI value improved from 0.813 to 0.829, representing a rise in two ranking places to 48th (Figure 1.7). The average annual HDI growth between 2010 and 2019 stands at 0.37%, slightly higher than the growth rate for Very High Human Development countries (0.35%), but significantly below that of Europe and Central Asia at 0.76%.<sup>16</sup>

Figure 1.7 Rising human development in Montenegro – before the pandemic



Source: UNDP, 2020

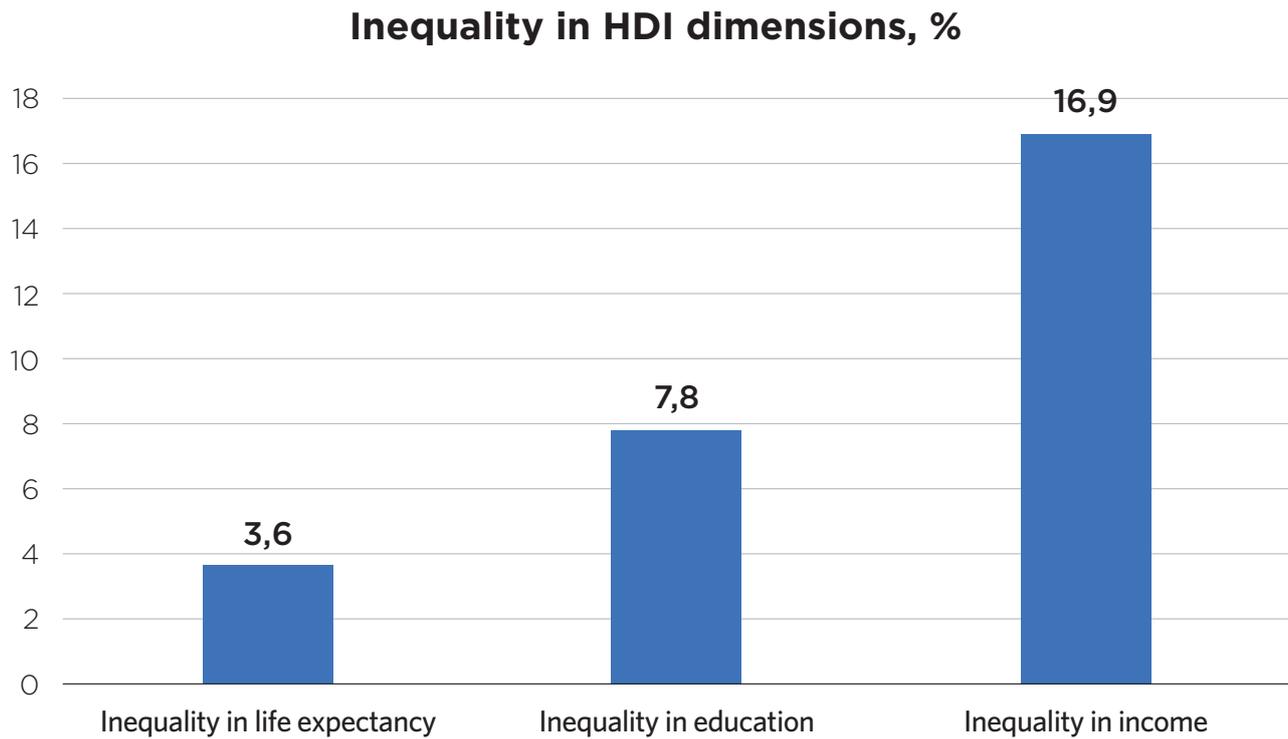
The estimates in this chapter draw on formal methodological approaches and the latest available international statistics at the time of publication of this report – for 2019. To support on-going policy dialogue on the effects of the COVID-19 pandemic, the next section (*Interlude: COVID-19 and human development in Montenegro: trends and projections*) in this report proposes a first look at how to establish a “COVID-sensitive” HDI measure specifically for Montenegro – and preliminary estimates on the costs to human development posed by the pandemic in 2020.

### Disparities in income stagnation as distribution of life expectancy converges

The inequality-adjusted human development index (IHDI) accounts for inequalities in the core HDI dimensions – living a long and healthy life, access to knowledge, and a decent standard of living – by “discounting” each dimension’s average value according to its level of inequality. The IHDI equals the HDI when there is no inequality across people, but falls deeper below the HDI the more inequality rises.

Overall, Montenegro’s HDI drops by 9.7% when adjusted for inequalities in distribution. The distribution of income sees the greatest loss to inequality across Montenegro – lowering the income index by 16.9% (Figure 1.8). By contrast, education sees a drop of 7.8% due to inequality, while life expectancy is more evenly distributed, experiencing a loss of just 3.6%.

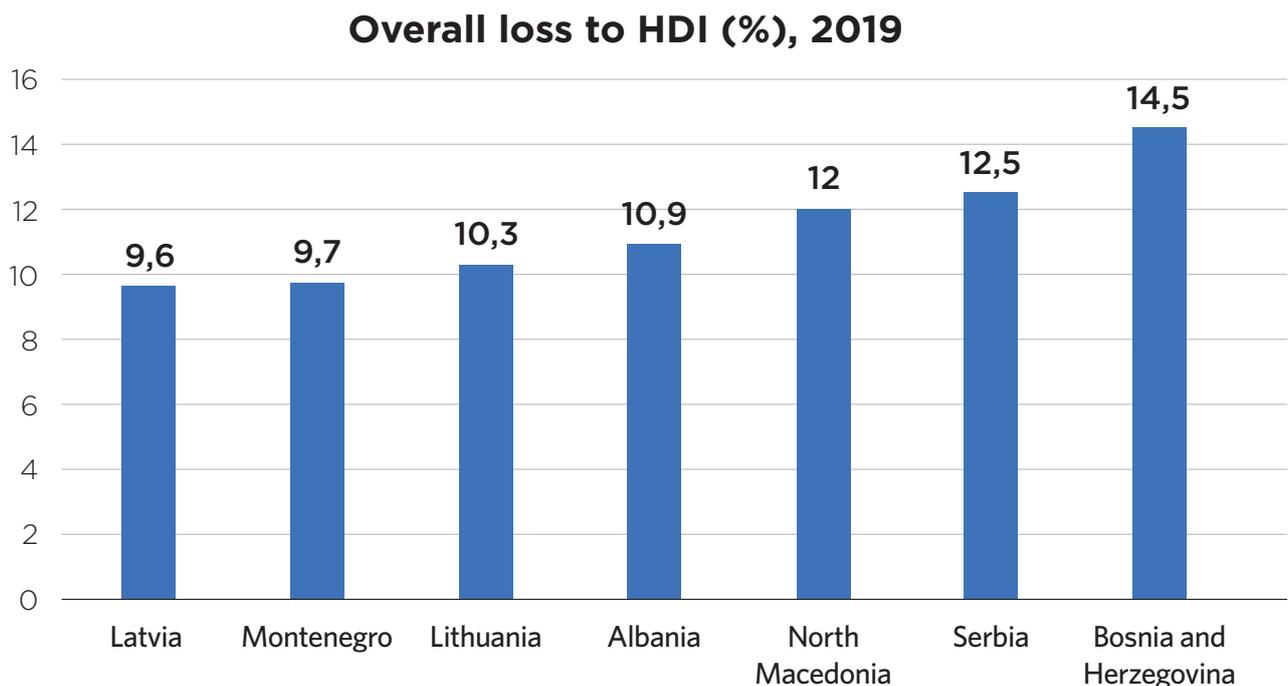
Figure 1.8 Disparity in incomes is the largest tax on human development in Montenegro



Source: UNDP, 2020.

Montenegro overall experiences a lower decline in the HDI due to inequality relative to its neighbours in the Western Balkans. When reviewing the overall reduction in the HDI in 2019, Montenegro's HDI declined by 9.7%, compared to a reduction of 14.5% experienced in Bosnia and Herzegovina – but this is still a marginally larger reduction than in Latvia (Figure 1.9).

Figure 1.9 Human development suffers a lower reduction in inequality than the neighbouring countries – except Latvia



Source: UNDP, 2020

## Women’s economic empowerment and leadership still lag behind men’s opportunities

At 0.814, the HDI for females lags behind that for males at 0.843 in 2019. The key driver of gender-based inequality is in the economic sphere. Women’s estimated gross national income per capita is just US\$17,518 (2017 PPP) – compared to US\$25,368 for men. Underlying this is women’s lower labour force participation rate at 46.5% compared to men’s at 62.8%.<sup>17</sup>

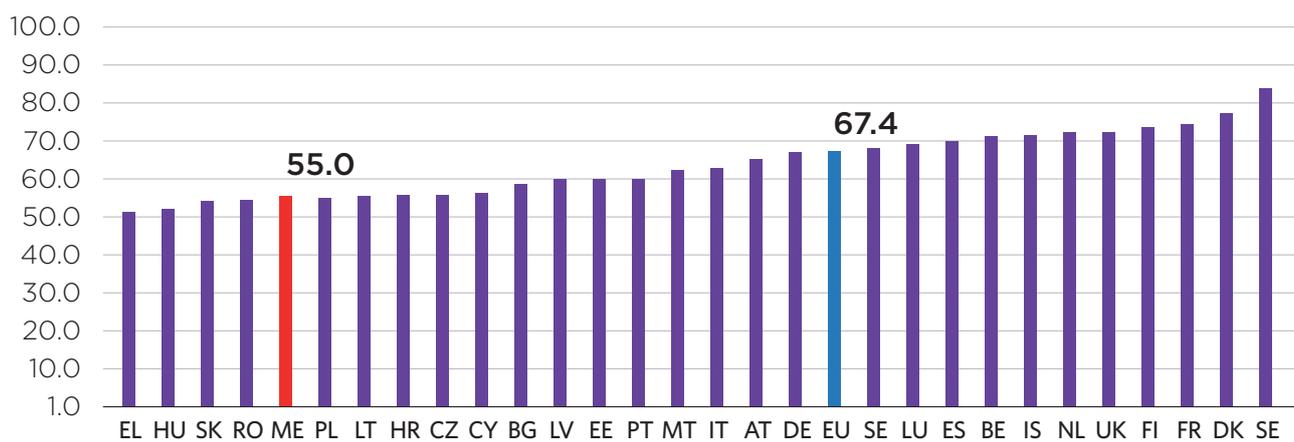
Gender-based economic inequity stretches to inequality in positions of leadership. Women’s share of seats in parliament is just 23 per cent.<sup>18</sup> Meanwhile, the share of women ministers reached 30 per cent, and membership on the boards of large companies only 22.9 per cent. While gender-gap in Montenegro on health and education are not extensive, women’s economic and political and leadership representation remains low relative to men.<sup>19</sup>

As many as one in three jobs in Montenegro are in the informal ‘grey’ economy, and lack stability and protections and exacerbate other forms of marginalization. Women are also overrepresented in the informal economy – at a rate of 16.6% relative to men’s participation at 11.9%.<sup>20</sup>

Developed by the State Statistical Office of Montenegro (MONSTAT) in cooperation with the Department for Gender Equality of the Ministry for Human and Minority Rights, the European Institute for Gender Equality (EIGE) and the United Nations Development Programme (UNDP), the gender equality index measures gender equality in the spheres of knowledge, work, money, health, time and power. Given Montenegro’s aspirations to join the European Union, the index provides insight into the situation of women in the country relative to the EU-28.

For the gender equality index, Montenegro has a score of 55 while the ‘average’ value recorded for countries in the EU-28 was 67.4 (Figure 1.10). This leaves Montenegro lagging behind most of the EU countries. The greatest differences in gender equality between the European Union and Montenegro related to the domains of money and power, while the smallest differences were evident in the domains of health and work.

Figure 1.10 Women’s economic empowerment significantly lags behind the European Union average



Source: MONSTAT, 2019s

Differences also extend to how the women and men spend their time. Compared to just 23.8% of men, 42.7% of women spend their time caring for and educating children, grandchildren, elderly or people with disabilities.<sup>21</sup>

## Ageing demographic profile increases pressure on social protection systems

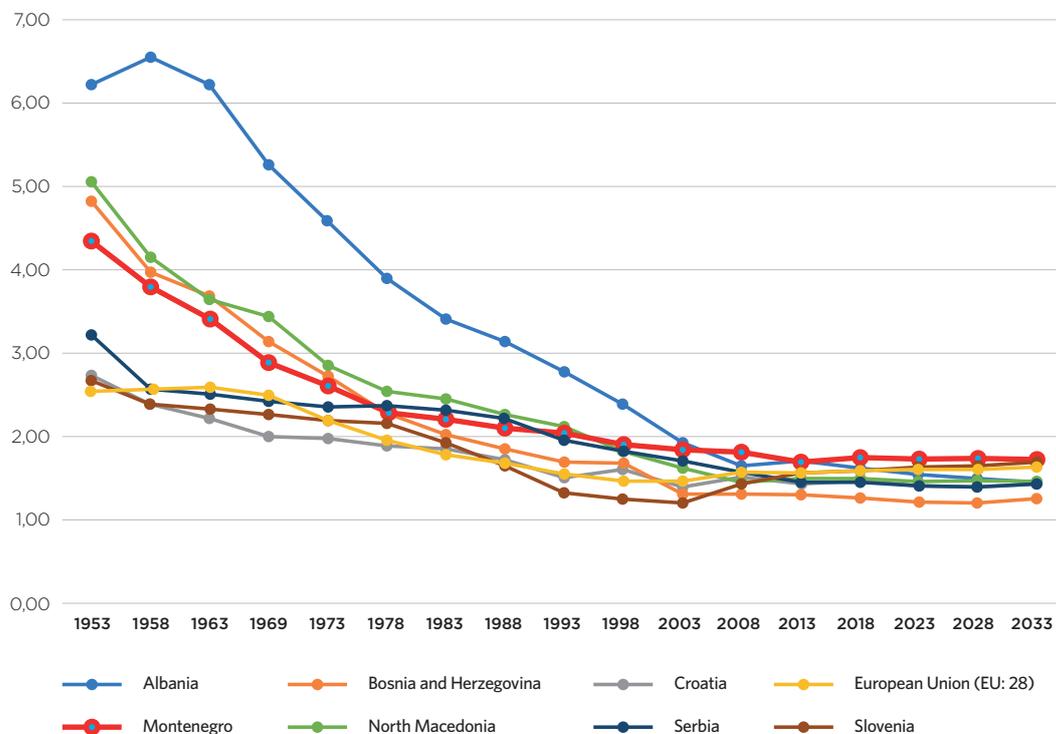
As in most of Europe, Montenegro's demographic structure experienced significant shifts in the last 30 years. On average, people in Montenegro live longer and grow to be older. However, in comparison to the countries of the European Union, Montenegro has a much younger population. In 2014, the median age in the European Union was 42.2 years, while it was 37.4 years in Montenegro. In the last 10 years the median age in Montenegro has increased by 2.5 years, while in the EU it has grown by 3 years.<sup>22</sup>

Demographic trends in Montenegro reflect the gradual ageing of the population – increasing life expectancy and a decrease in fertility.<sup>23</sup> From today's life expectancy at birth of 77.3 years, it is projected to reach 83.6 by 2060. The increase in life expectancy will be followed by an increase in the dependency ratio<sup>24</sup> from 19.6% in 2011 to 38.0% in 2060.<sup>25</sup>

The ageing of the demographic profile of Montenegro is coupled with the shrinking share of the population under 15 years of age. In 1971, the proportion of the population under 15 years of age was 31.9%. By 2017, this proportion reached 18.1%. During the same period, the proportion of the population aged 65 and above nearly doubled – from 7.6% to 14.8%.

The total fertility rate in Montenegro has followed largely similar patterns of decline to the European Union and the other Western Balkan countries since the 1950s. But by 2013, the fertility rate in Montenegro had stabilized at a higher level compared with the EU-28 countries and especially so relative to other Western Balkan countries (Figure 1.11). This shift explains why Montenegro has a much younger population. The Montenegro population is projected to start declining in around 2030.<sup>26</sup>

Figure 1.11 Montenegro's total fertility rate stabilized at higher level relative to EU and Western Balkans



Source: UN, 2020. Fertility rate: the total number of children born or likely to be born to a woman in her lifetime.

Montenegro's ageing demographics levy a growing cost on the country's pension and long-term care and health systems. This pressure mounts as the ageing population exits the paid jobs market, increasing the burden of financing the retirement of the ageing population on the shrinking number of employed working-age people.<sup>27</sup>

## The human costs of COVID-19

When the history of 2020 is written, COVID-19 will play a central role. Unlike the few systemic risks, the novel coronavirus threatens human development, community organization, government planning and processes like digital transformation – altering the course of global and national economies, including Montenegro's.

The total number of cases per million inhabitants on 30 November 2020 was 56,146, and Montenegro ranked third in the world according to this parameter. For a period, the pandemic was slow to take root in Montenegro: no active cases were recorded between 24 May and 18 June 2020. But by 23 July, 241 new active cases had been detected, and by 29 July there were 474 active cases per 100,000 people.<sup>28</sup> Severe spikes were visible in the daily figures in October and November.

In 2020, the world's reaction has been to go remote: promoting social distancing as a new way of life, working remotely where possible, emptying schools and university campuses in favour of centres of online learning, encouraging remote healthcare and the operations of essential services digitally. In Montenegro, protective masks both indoors and outdoors were mandatory as of 21 July across the entire country, gatherings were limited to 40 people outdoors and 20 in closed public spaces.<sup>29</sup> Yet weak enforcement of these measures led to a resulting spike in infection rates, hospitalization and deaths.

The economic collapse resulting from the direct and indirect response to COVID-19 is unprecedented. The IMF projects that Montenegro will face a 12% drop in 2020 – its largest economic contraction since independence in 2006. This is rooted in a projected 50% decline in tourism relative to 2019.<sup>30</sup>

The response to COVID-19 must be informed by a set of human development principles:

- *Ensuring equity:* Not all communities, groups or peoples have been affected equally. Indeed, the nature of a full response must recognize and see COVID-19 through an equity lens – and ensure those groups already lagging behind are supported.
- *Focus on people's enhanced capabilities:* For countries such as Montenegro, where the basic capabilities in the standard of living, health and education have been achieved, more advanced capabilities must be strengthened. This report focuses precisely on the digital skills need to ensure resilience.
- *Follow a holistic, multidimensional approach:* While at root a health crisis, COVID-19 has shown how economic and social dimensions remain connected. A systemic approach is necessary towards establishing a route back to human development progress.

Digital transformation is central to a robust recovery that ensures equity, builds resilience through people's enhanced capabilities, and addresses the multidimensional consequences of COVID-19. The key to making digital transformation a part of the effective response to COVID-19 will be to establish trust in a digital future for Montenegro. While digital transformation at first glance seems to inhabit a world of bytes, computers, software and data, it is ultimately about people, business and government. Laying the groundwork for a digital transformation that harnesses technology to guide the flourishing of human development is no longer a task for a distant future. It is required today.

## Harnessing digital transformation for human development

Will technological transformation close divisions – or will it entrench Montenegro’s wealth, gender, climate and location-based inequalities? While the history of technological diffusion creates winners and losers, the choice is ours. What is clear is that digital disruption must serve the ends of building human capabilities, rather than the designs of economic growth, private accumulation of capital or concentration of political power. Digital transformation must place human development at its centre.

Multiple forces will shape our choices. A range of dynamic risks and national, regional and global trends will influence the current and future trajectory of the impact of digital transformation on human development in Montenegro. These will include:

- **Growing income-, gender-, location- and wealth-based inequalities.** As this chapter shows, digital transformation is already under way in Montenegro. But it is serving to carve deeper and more persistent inequalities. Policies and investments must be made to redirect the potential of digital technologies away from embedding disparities towards propagating platforms for inclusiveness, participation and solidarity.
- **Emerging and future threats of climate change.** Greening Montenegro’s growth is essential to ensuring sustainable development over the long term. In Montenegro, the situation with clean energy is relatively strong: in 2018 78.5% of the gross final consumption of energy came from renewable sources, largely due to the utilization of hydroenergy.<sup>37</sup> Currently, solar energy makes up approximately 0.8% of final energy consumption<sup>37</sup> but plans are under way to increase the share of solar energy. The facilitation of a full transition to clean energy and electric transportation and adaptation to inevitable climate impacts are needed now more than ever. Achieving these demands can shape the nature of which digital tools we create – and how we use them for the social good.
- **The disruption of system-altering trends.** At the end of 2019, discussion of systemic risks seemed at best academic and at worst fear-mongering. But today it is obvious the impacts of forces such as COVID-19 that can alter the course of entire economic, social and environmental dimensions of human development must be reflected on and considered, because they may not end solely with the novel coronavirus.

Certainly, digital transformation is not a one-way trajectory to human progress. In large social upheaval, the most vulnerable, including women, young people and those in the informal economy are typically disproportionately impacted. Many are already being subjected to other inequalities – lack of healthcare, poor quality education, informal work, climate risk, and social and legal discrimination.

Digital transformation can serve not only as a brake to vulnerability, but also to accelerate human development through the changing world of work, strengthening systems of education and innovation and fulfilling the potential of public administration through e-services.

## Interlude: COVID-19 and human development in Montenegro – trends and projections

As part of the research process for this report, a special Statistics Panel of Montenegro and international experts was formed to estimate the human development costs of COVID-19 in Montenegro. This work builds on the UNDP Human Development Report Office's estimates on the decline in the human development index (HDI) due to COVID-19 and looks to assess in-depth factors impacting the economic, education and health systems at the national level in Montenegro.

Rather than aiming to argue for a new methodological approach to the production of the HDI, this report provides initial insights into how to recalibrate the HDI to capture the impact of the pandemic as close to "real time" as the available statistics will allow.

As reviewed in Chapter 1, the HDI consists of three fundamental dimensions of human capabilities: achieving a reasonable standard of living; enjoying a long and healthy life; and the ability to be knowledgeable. This interlude explores what a COVID-adjusted HDI specifically tailored to Montenegro could look like.

It does so by:

- Establishing pathways of impact of COVID-19 on the three fundamental dimensions of human development
- Proposing methods sensitive to COVID-19's impact and able to capture the shifts in the HDI in 2020
- Discussing potential scenarios of COVID-19's impact on human development in Montenegro into the near and long-term future
- Making the case for the development of a dashboard of indicators to track the impact of COVID-19 on human development
- Setting out a research agenda to strengthen our ability to build resilient strategies

### Pathways of COVID-19's impact on human development

#### Standard of living decline

COVID-19 imposes direct economic disturbances through the economic shutdown and direct lives lost, but also indirect economic effects through loss of productivity of the labour force due to exposure to the disease.

Under the indirect pandemic-related implications, increased public debt may play an important role in the long-run. Overall, the impact was negative, leading to a slow-down in economic growth, but the impact differs between sectors, regions and particular groups in Montenegro. Inequality is likely to increase due to the asymmetrical impact of the COVID-related measures and mitigation strategies that different individuals and households can afford to implement.

A number of fast-growing countries are finding that their high GDP growth rates are failing to reduce the socio-economic losses of parts of their population. Even highly developed countries show that high income is no safeguard against the rapid spread of problems such as the emergence of drugs, alcoholism, AIDS, homelessness, violence and increased family fragmentation. At the same time, low-income countries have shown that it is not possible to achieve high levels of human development without different ways of using human capabilities.

Montenegro is particularly affected by a decline in tourism, which is a critical growth factor; revenues from tourism account for over 25% of GDP (in 2019 it was 24%). At the time of writing this report, the World Bank estimated that drops in tourism receipts of 34% and 50% would correspond to a contraction in the economy of 5.6% and 9%, respectively. High public debt further increases the sensitivity of the Montenegro economy, which ultimately affects the HDI.

According to World Bank projections, tourism revenues will be reduced by half and will lead to a sharp decline in exports of services, exacerbating the economic recession in the country. In 2020, total exports are projected to decrease by 28% and imports by 18%. Under this scenario, consumption in 2020 would decrease by about 7%, due to a large drop in employment and wages. Moreover, given the lower profitability and higher outflows from growing markets, banks will be forced to limit lending. This in turn implies a larger drop in investment, which would be reduced by an estimated 14% in 2020.

### Education system effects

There is no reasonable reason to expect a decline in the literacy rate due to the pandemic in the short run. This is not the case, however, with regards to enrolment rates, particularly net enrolment rates.

Schools in Montenegro were closed in the second quarter of 2020 and in the autumn their opening was delayed from the start of September to 1 October. During that period, children watched lessons on TV and did homework, but no other activities were implemented. From September 2020 students up to the sixth grade returned to school, while the others followed schooling online.

In the short run, the transition to distance learning could lead to an effective drop out from education of children from groups with limited technological or financial access to such platforms or the soft skills to use them. In the long run, the net enrolment rate will likely fall due to an increased number of repeaters. Increased inequality between different groups could augment the short and long-term risks further.

The situation of particular groups at higher risk of poverty, social exclusion and violation of rights deserves particular attention. Apart from historically vulnerable groups such as the Roma, these might include children with disabilities or children living in households experiencing material deprivation.

The long-term implications of the pandemic include a drop in the net enrolment rate due to an increased number of repeaters that can be captured in the years to come. It is reasonable to expect that certain age cohorts will have COVID-19 “sub-cohorts” of children whose education opportunities have been marred by the 2020 lockdowns, distance learning, the impact of the limited social interaction and other – e.g. psychological – implications of the pandemic.

Monitoring the development of these “COVID-19 sub-cohorts” would be critically important for securing equal opportunities for these children. This would be essential to support the identification of vulnerable groups so that they do not get left behind.

## Health outcomes

The direct health impacts include the loss of human life, and indirect consequences include increased morbidity due to COVID-19 and dragging post-infection complications. Patients with other diseases in particular lack medical treatment, impacting their wellbeing.

The indirect health implications include increased morbidity due to COVID-19 and dragging post-infection complications. As with the COVID-induced decline in life expectancy, the challenge would be to identify the complications associated with COVID-19.

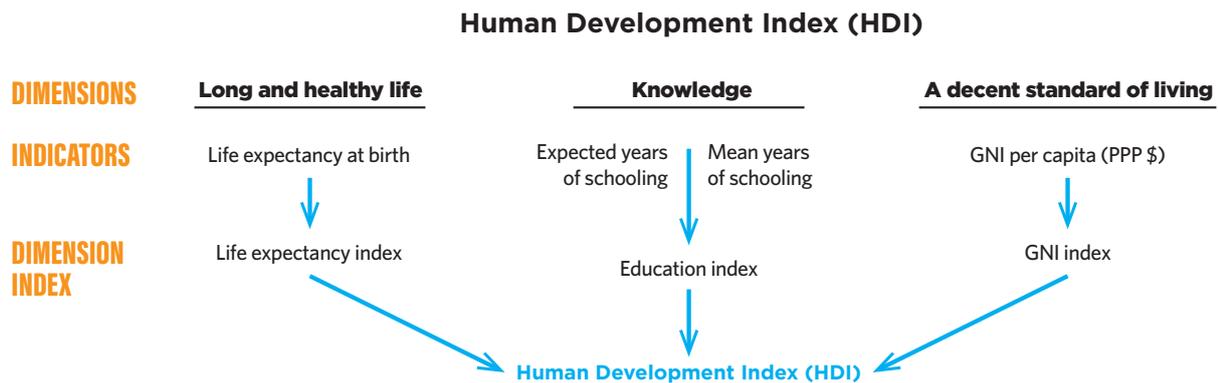
This health crisis is different from previous crises because it involves shocks on both the supply side (disruption of supply chains) and on the demand side, including lower earnings and the effects of social distancing. It affects countries through multiple channels, including underutilization of human and physical capital, lower commodity prices, fewer tourists, net capital outflows from growing markets, declining lending and high uncertainty.

## Estimating a COVID-sensitive HDI

The methodological approach to calculate the HDI at the global level relies on the standardization of international statistics to ensure comparability across countries. This usually means a 1–2 year lag in the availability of international statistics. In effect, under normal circumstances, the calculation of the HDI then captures the impact of processes that have taken place in previous time periods. As such, large-scale shocks – whether a financial crisis or a pandemic – will be reflected in the statistical data in the value of the HDI that will be calculated in 2021 based on 2020 data.

But that is a long time to wait for a better sense of the urgent consequences of the COVID-19 pandemic. And the circumstances are beyond normal. Already driving the policymaking agenda in Montenegro, the capturing of the unfolding pandemic reality in real time is not only statistically defensible but also needed as an “early warning” tool.

The normal HDI is calculated based on four indicators:



These indicators are calculated into a corresponding sub-dimension index as follows:

$$\text{Dimension index} = \frac{\text{actual value} - \text{minimum value}}{\text{maximum value} - \text{minimum value}}$$

And then aggregated to produce the HDI using the geometrical mean of the three-dimensional indices:

$$\text{HDI} = \left( I_{\text{Health}} \cdot I_{\text{Education}} \cdot I_{\text{Income}} \right)^{1/3}$$

To capture the consequences of COVID-19 in the HDI requires adjustments to the three core steps in calculating the HDI.

- **Economic dimension:** To capture the sensitivity to COVID-19, the same economic dimension sub-index is proposed to be included using the up-to-date gross domestic product per capita, constant prices for 2019 data available, but adjusted for the expected overall GDP rate of decline, estimated at the time of publication at -12% by the IMF.
- **Health dimension:** New estimates for 2020 are, as of the time of publication, unavailable for including the costs of COVID-19 to the overall health levels in Montenegro. Thus, this sub-index uses United Nations Department of Economic and Social Affairs life expectancy projection data for 2019, as it is complex to recalibrate at a high level the life expectancy at birth for the country as a whole. A continual area to look out for will be the externalities of COVID-19 in potentially unexplained deaths and mortality.
- **Education dimension:** It is proposed to reduce this sub-index by the drop in the expected years of schooling already visible in 2020 as a result of school closures in the second quarter of 2020.

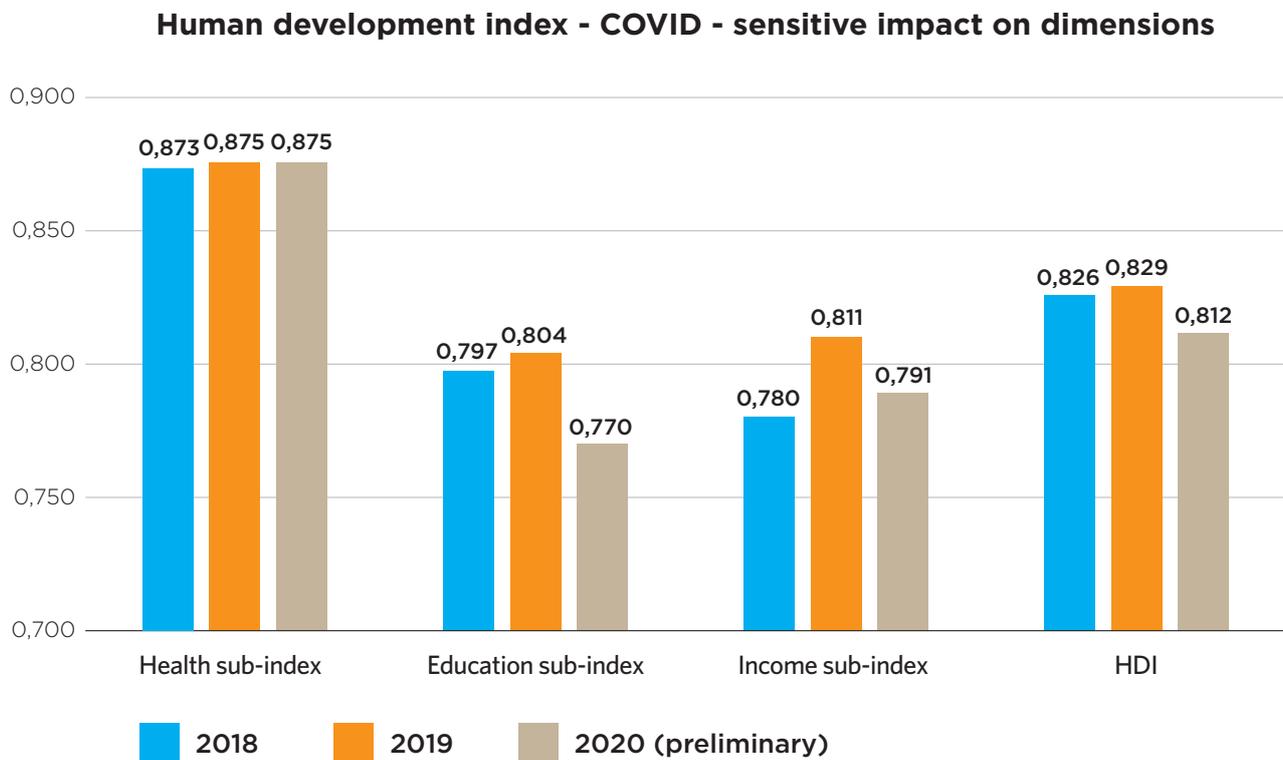
Table A Estimating the human costs of COVID-19 in Montenegro

Economic dimension		Health dimension		Education dimension	
Pre-COVID (2019)	COVID-sensitive (preliminary 2020)	Pre-COVID (2019)	COVID-sensitive (preliminary 2020)	Pre-COVID (2019)	COVID-sensitive (preliminary 2020)
Gross national income (GNI) per capita: 21,399	Gross national income (GNI) per capita: 18,831	Life expectancy at birth: 76.9	Life expectancy at birth: 76.9	Expected years of schooling: 15.0 Mean years of schooling: 11.4	Expected years of schooling: 14.07 Mean years of schooling: 11.4
As published in HDR 2020	Projected based on IMF 2019 GDP per capita and an anticipated -12.0% decline in GDP in 2020.	As published in HDR 2020	Assumes same life expectancy as 2019 as updated data are unavailable.	As published in HDR 2020	As recalibrated based on inclusion of the school closures in Montenegro in 2020

## COVID-19 risks reversing more than six years of progress

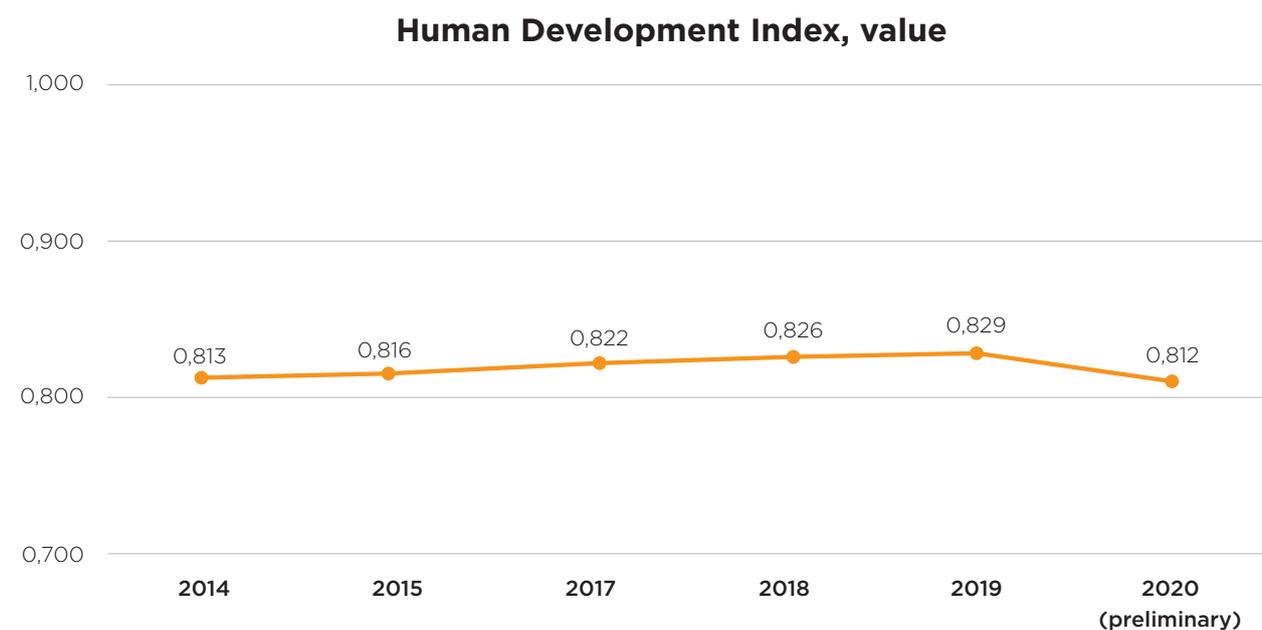
Based on these calculations, the COVID-sensitive HDI for Montenegro can be estimated as 0.812 for 2020. This represents a decline of 2.13% from the HDI value of 0.829 in 2019. COVID-19 risks reversing at least six years of human development progress in Montenegro down to levels not seen since 2014.

Figure A COVID-sensitive human development impacts



Source: UNDP, 2020, and preliminary estimates produced for this report

Figure B COVID-sensitive human development trends – preliminary estimate for 2020



Source: UNDP, 2020, and preliminary estimates produced for this report

## Future scenarios

The impact of COVID-19 and other factors on the human development situation and future projections for Montenegro:

- The COVID-19 crisis has exposed Montenegro's sensitivity to external shocks
- Growth was expected to slow in Montenegro, but projections suggest that the crisis will push the economy into recession, primarily due to the reduction in tourism
- The government has enacted measures to mitigate economic and social impacts, but fiscal reserves are limited and they will reduce the volume of financing.

How might the pandemic and its response evolve over time?

- **2020.** In 2020, Montenegro is currently facing a significant decrease in income because of the drop in economic activity and the vulnerability of the country's economic structure based on services to the pandemic's impact. Households with a lower income are especially vulnerable due to the loss of jobs as well as lower wages. These trends will lead to a rise in poverty and a decrease in the living standard. However, these changes will likely be felt more evidently through relative poverty indicators. Remittances from abroad have not dropped significantly, providing a "buffer" for the decreasing income in Montenegro, at least for time being.<sup>31</sup>

As the health system focuses on fighting COVID-19, health services generally have weakened, or are provided with delays or not at all. This makes different population groups more vulnerable to the health effects of the pandemic. Weakening public health services are likely increasing out-of-pocket expenditures on health. And the effects of reorganization of the education system in response to the pandemic are already levying immense costs in terms of school enrolment as well as school attendance among the poorest households with many children.

- **2021.** A slight increase in economic activity during the summer of 2021 may also spur economic activity in other sectors including transport and agriculture. The economy will record positive but exceptionally low economic growth rates. However, the overall trends are likely to remain strongly negative. Indeed, no significant improvement is expected among the most vulnerable population groups that will continue to face challenges due to job losses and a drop in income.

During the 2020/2021 school year, education will be organized as a combination of online and in-school learning. This will contribute to pressure being applied to some social groups with lower income over others, which may lead to a slight increase in the out-of-school rate especially among poor households and those with students in secondary education.

Educational outcomes will likely be lower as a consequence of the shift in pedagogy and knowledge transfer but also due to the different experiences with online learning: those with limited online access and support within the households will suffer most, including poor households, children with disabilities and Roma. The lack of socialization due to online learning, especially to some age groups (third cycle of the primary school) may affect the mental health of school children and may require social support programmes. The school year may start with classical in-school lectures, but some of the negative trends that were initiated during the previous school year will not be immediately stopped.

The health services will still be limited. Early childhood development may be acutely affected due to considerable drops in family incomes leading to inadequate nutrition, mental health challenges and other challenges.

- **2025.** By 2025, positive signs of recovery may be visible in specific sectors, such as tourism and transport, that would spur employment and higher income. However, new investment and initiatives will likely remain missing – and no new driver for economic activity may be visible. Without bold new visions, the economy may overall be seeking to return to pre-COVID levels. Improvements will be evident among the living standards of poor households. The health system will be functioning better but will require significant investment to fully respond to the needs of citizens. Education may return to normal, but without significant structural changes the educational outcomes are limited and do not contribute to accelerated skills and human development outcomes.

Establishing and following a strategic road map to implement the Smart Specialization Strategy goals of achieving a healthy, sustainable, modern, and digitally transformed Montenegro can strengthen sector-based policies. On its EU accession path, apart from building a modern political system based on the rule of law, it will continue to be vital to have a competitive economy, primarily for small and medium-sized enterprises.

Indeed, the European Green Deal can serve as an additional source of inspiration for a renewed policy agenda. A green transition or decarbonization and digital transformation that pervades all segments of society can offer opportunities for sustainable economic growth and, more importantly, accelerate human development for Montenegro people, not expressed only by the average GDP-based income, but also other factors that affect the quality of life, such as the use of space and less polluted and congested cities, among other things.

- **2030.** Economic activity will be back to pre-COVID levels. New investments will be working to create new opportunities. New capital formation may be invested in health, social support and education programmes. The education system will be back to functioning as usual, while education reform will create the scope for an increasingly digitalized economy, with ICT a focus.

Investing in green growth and digital transformation will yield long-term benefits and, together with diversification of the financial system, strengthening of the education sector, and a reduction of the administrative burden, Montenegro will have a stronger chance to break free from the middle-income trap and reduce dependence on one sector of the economy.

## Towards a human development–COVID impact dashboard

The COVID-sensitive HDI proposal represents only a first step in the process to develop increasingly real-time tools and analysis to better guide evidence-based policymaking and strategic interventions. A human development–COVID impact dashboard can complement the power of a single data point to reflect human development.

To build such a dashboard, various sources can be relied on beyond the standard statistical research available. These can include:

- Big-data sources to capture perceptions;
- Social network analysis including drawing on Facebook and other online exchanges.

While notably these tools cannot be confused with objective reflections of the situation in Montenegro, they can shed additional insight on the psychological dimension of health, people’s fears and other well-being concerns.

## A future research agenda

Indeed, COVID-19 is opening up a future research agenda as it lays bare many of the limitations in our current frameworks and development models.

Representing over 10 percent of GDP in recent years, understanding how remittances function as a tool for resilience will be one of them.

And in terms of education, it can be more easily recognized that Montenegro lacks longitudinal studies. Filling in this gap with statistical data from regular surveys, beyond ad-hoc studies completed with international donor support, can support the development of data and insights into how trends and patterns affect the same cohorts over time.

Overall, a renewed research agenda can help policymakers and researchers to better track the effects of long-term policies – and inspire new avenues to accelerate human development in Montenegro, today and into the future.

## Chapter 2

### Pathways for inclusive digital impact: the changing world of work

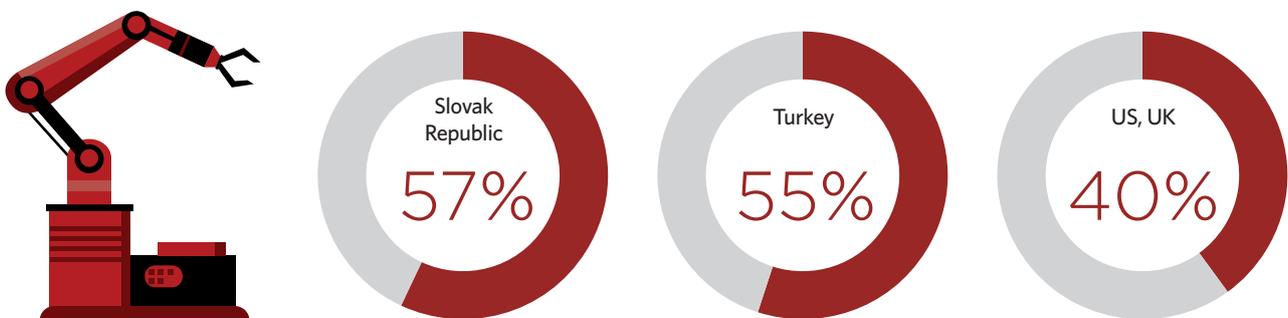
How can digitalization lead to inclusive economic transformation and work in Montenegro? This chapter establishes the structure of Montenegro’s economy, emphasizing the situation of the labour market, the information technology (IT) industry and informal work. As such, the chapter assesses the extent to which digitalization has already disrupted and will continue to disrupt various dimensions of the economy – moving from informal to formal work in agriculture and industry, but most especially to services, the largest jobs sector in Montenegro’s economy.

The major risk to human development by the shift to an increasingly digital economy is channelled through the labour market. Disentangling the critical pathways through which digital transformation threatens Montenegro’s jobs, the question becomes: how can we convert the risks into positive pathways to change the world of work towards more inclusive and decent opportunities and better serve the economy as a whole?

Digital transformation will impose the largest costs on the labour market. According to the European Bank for Reconstruction and Development, workers in this region face a significantly higher risk of job automation than in other advanced economies. The reason: 13% of the decline in employment observed in 11 EBRD economies in Central and South-Eastern Europe<sup>1</sup> can be attributed to job automation by robots.<sup>1</sup>

Indeed, the average probability of a job being automated in the foreseeable future is 57% in the Slovak Republic and 55% in Turkey, compared with around 40% in the United States and United Kingdom (Figure 2.1). Manufacturing jobs face the highest risk of automation.<sup>1</sup> On the other hand, in Montenegro the employment share of medium-skilled and low-skilled occupations declined over the period 2006–2016 by approximately 5% on account of the employment share of high-skilled occupations.<sup>1</sup>

Figure 2.1 Proportion of jobs at risk of being automated across countries



Source: EBRD, 2018

\* The countries that belong to the EBRD region of South-Eastern Europe include Montenegro.

A key concern is to ensure that no-one is left behind by the wave of digital transformation, especially vulnerable groups in Montenegro who will be impacted by a changing digital future.

- **Ensuring decent work for young people.** This chapter will assess the level and trends in employment and unemployment, with special emphasis on youth unemployment. This section will tease out the policies and strategies currently in place and whether they are effective in creating job opportunities for young people. It further analyses the nature of employment by type and by sector, over time and across rural and urban areas. The chapter will look at the performance of the economy vis-à-vis job creation. It analyses the role of industry in creating jobs and assesses the extent to which digitalization promotes productive employment and wealth creation.
- **Critical roles for women.** Women's participation in digital development and in taking leadership roles as managers and decision-makers in the formulation of digital development is critical for an inclusive digital transformation in Montenegro. But also, women's positioning to benefit from digital growth and gender transformative impacts (creating more gender equality) on women's and men's respective needs will be discussed.
- **Protecting low-income wage earners and informal market participants.** These groups will be impacted by an increasingly digitalizing workforce and labour demand. Based on the available data and global experience, the chapter will detail the consequences for low-income wage earners and how those lacking protection in the informal economy will be impacted by drivers of digitalization in the labour market – and how they can be supported through labour, education and protection policies in order to benefit from digital transformation.

Following the conceptual framework, the role of the IT business infrastructure will be assessed as engines for digitalization. Finally, the extent to which current government policies foster or inhibit the positive relationship between work and digital transformation and can reduce the negative impacts will be set out as a connection to the final chapter's recommendations.

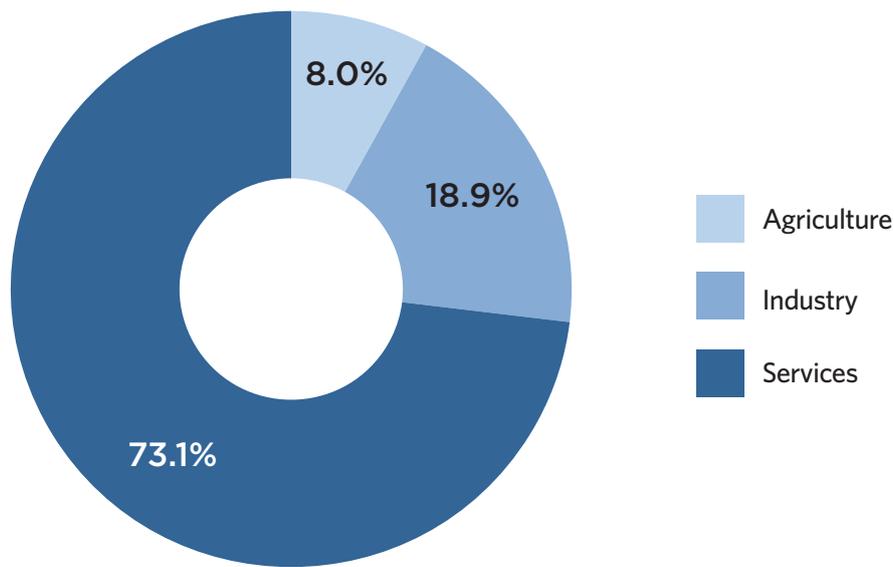
## The structure of Montenegro's labour market

Despite recent increases, the employment rate in Montenegro is low – especially for women and young people. At 46%, one in every two Montenegro people over 15 years of age has no job. Moreover, one in three of the jobs available is informal. The employment rate for those aged 15–64 in Montenegro is 54%, compared to 65% in the EU. To reach the EU average employment rate (65%) Montenegro would need to create another 40,000 jobs. Since 2011, about 6,000 new jobs have been created annually, meaning that at that rate it would require 8–9 years for Montenegro to reach the number of jobs required.<sup>2</sup>

### 73.1% of jobs are in services

The overwhelming majority of Montenegro people in the formal labour market work in the services sector (73.1%), followed by 18.9% in industry and construction, and 8.0% in agriculture, forestry and fishing (Figure 2.2).

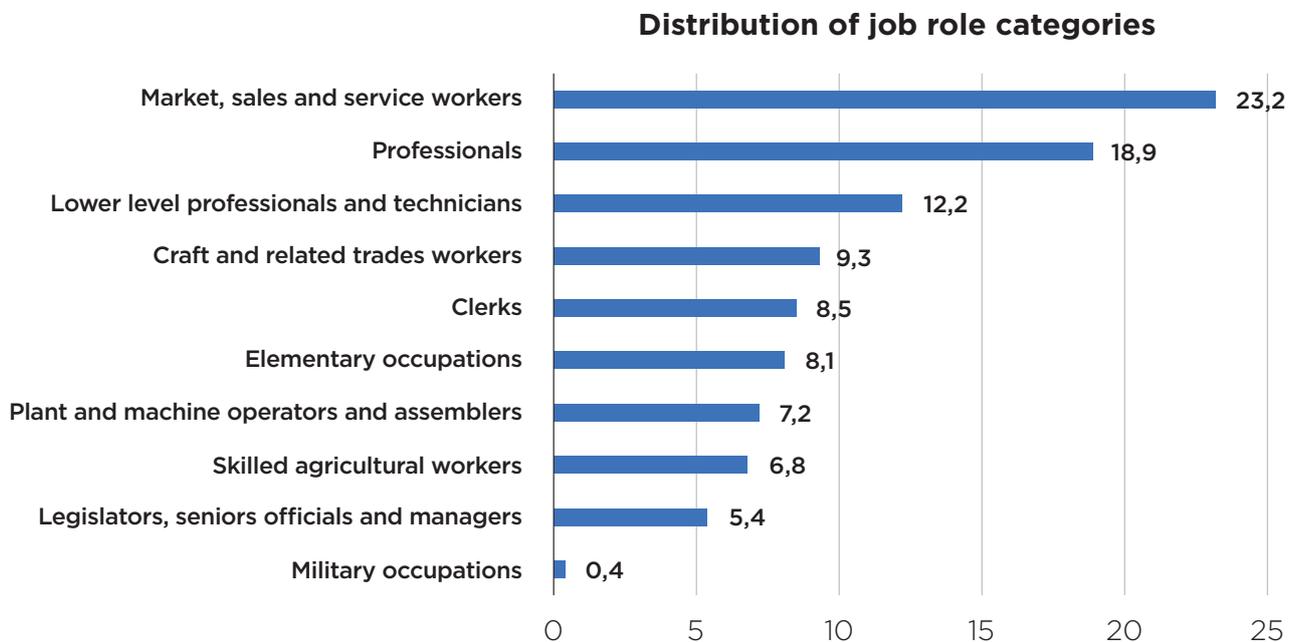
Figure 2.2 Services dominate the formal labour market



Source: MONSTAT, 2019b

Within services, market, sales and service workers represent the largest share of job roles, at 23.2%. Professionals hold 18.9% of the job roles, followed by lower-level professionals and technicians at 18.9% (Figure 2.3). The share of workers in other categories range from just 0.4% in military occupations to 9.3% working in craft and related trades.

Figure 2.3 Market, sales and service workers and overall professionals hold the largest share of job roles in Montenegro

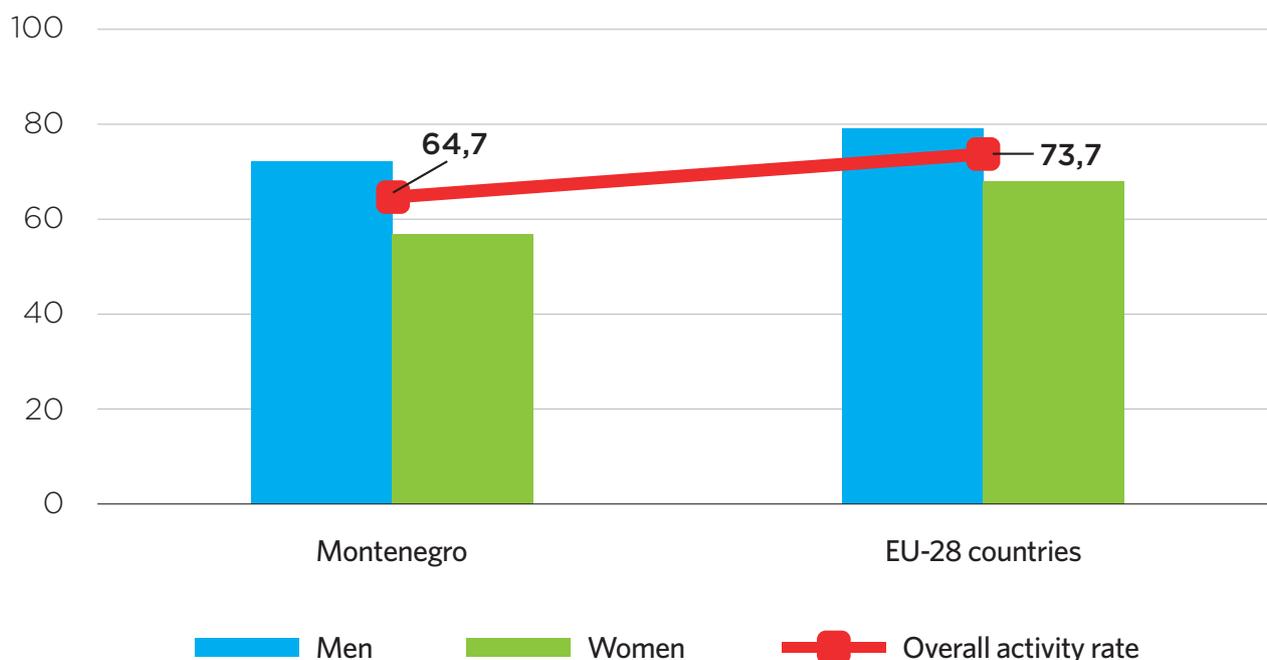


Source: MONSTAT (2019b)

## Women and uneducated are overrepresented among the economically inactive

A persistent dynamic in Montenegro's economic structure remains the low labour force participation rate. Just 64.7% of those aged 15–64 in Montenegro are economically active, nine percentage points lower than the European Union average (Figure 2.4). One of the main reasons of the low activity rate in Montenegro is a high share of informal work.<sup>3</sup>

Figure 2.4 Labour force participation rates for the population aged 15–64 in Montenegro and EU-28 countries by sex



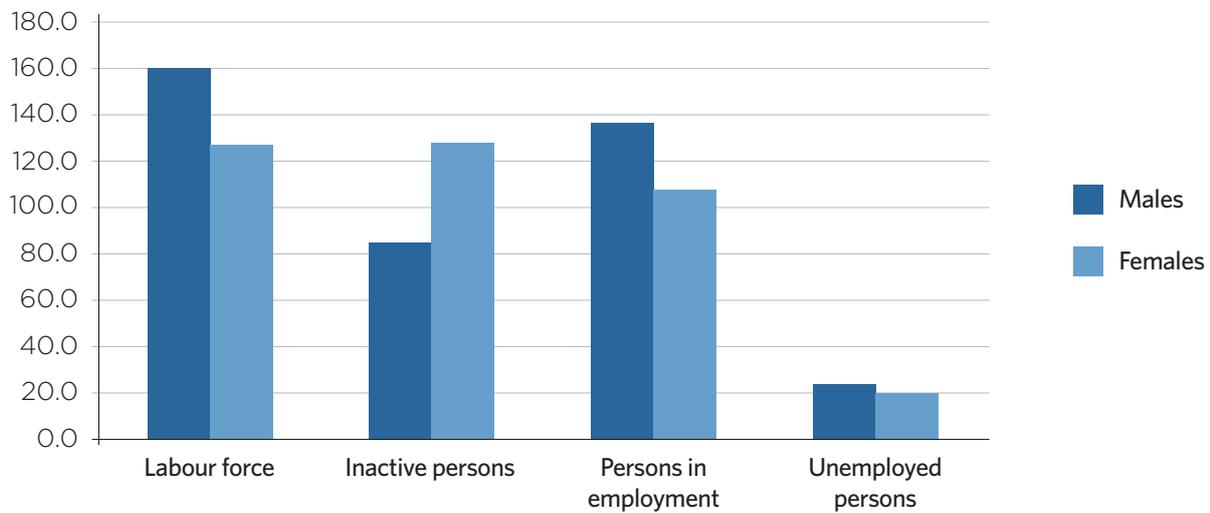
Source: Eurostat, 2019

In Montenegro, the share of population that is inactive is considerably higher among women than men. Out of the total number of the labour force, 60.3% of the inactive people are women and 39.7% are men (Figure 2.5). The low education levels of women appear to drive the low female activity levels.<sup>4</sup> In Montenegro, the share of women with low levels of education among the working-age population is about twice as high as the share of low-educated women in the labour force.<sup>5</sup> Other reasons that contribute to high female inactivity are family responsibilities or a lack of affordable childcare services.<sup>6</sup>

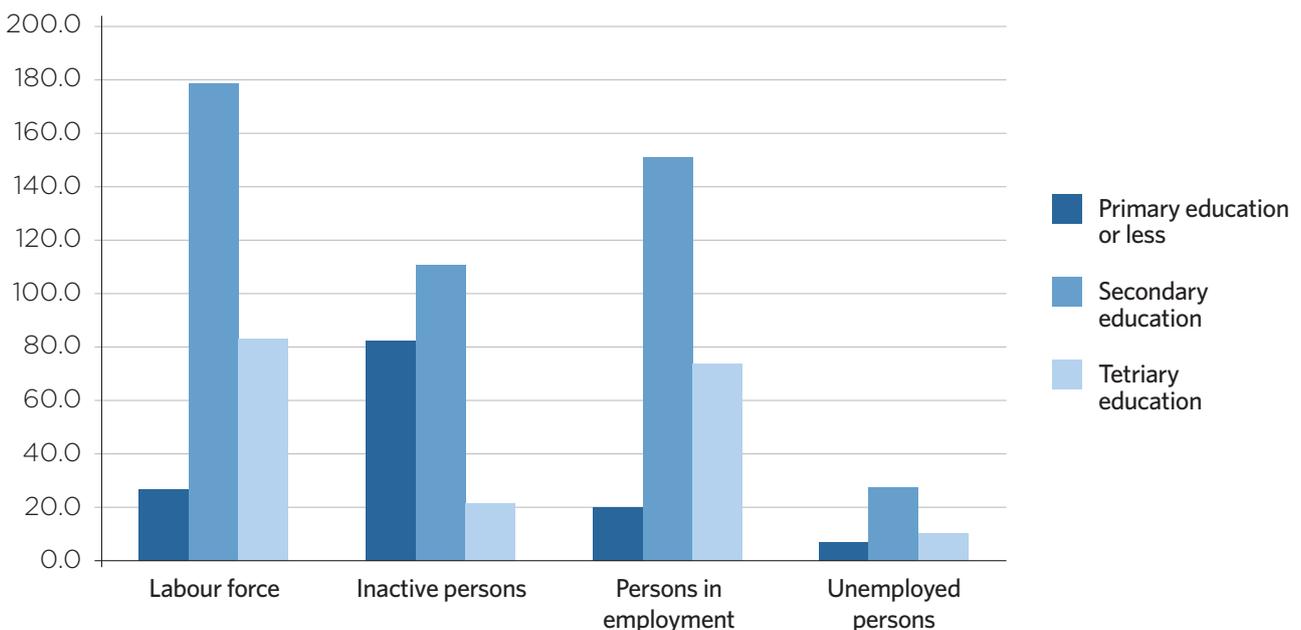
Education also plays a critical role in economic activity. In terms of educational attainment, 10.5% of the population of Montenegro has attained only primary education or less, 69.7% has finished only secondary education, and 19.8% has tertiary education.<sup>82</sup> However, the share of people in Montenegro with only completed primary school education or lower is four times as high among inactive people than those in employment (Figure 2.5). In its overall economic structure, Montenegro shares multiple patterns with other Western Balkan economies (Box 2.1).

Figure 2.5 Women and the less educated significantly overrepresented among the inactive population

(a) Status of working age population, by sex (thousands)



(b) Status of working age population, by education level (thousands)



Source: MONSTAT, 2020a

### Box 2.1 Montenegro and economic structure in the Western Balkans

Given the spill-over effects, shared boundaries and mutual histories, mapping the economic structure across the Western Balkans demonstrates common patterns. Key challenges in the labour markets of Western Balkan countries include: low activity rates, a large percentage of young people not in employment, education or training (NEET), a large level of long-term unemployment and a high degree of informality.

The average activity rate of the labour force in Western Balkans was 62.8% in 2018 – caused by the low participation of females in the formal labour market. Average unemployment stands at 15.3%, with nearly one in every four young people not in employment, education or

training in all six Western Balkan countries. Long-term unemployment, which refers to people unemployed for 12 months or more, is another persistent challenge: with one in 10 in the labour force stagnant.

Informal employment looms large across the Western Balkans. Albania has the largest share of informal employment in the region – one in every three people is working informally, compared to one in five in North Macedonia and in Serbia. This pattern, however, is not immutable. Since the 2015 launch of a campaign against informal work, the share of informal employment in Albania dropped from 50% in 2014 to 36% in mid-2018.

Source: WIIW, 2018; WIIW, 2019

### Informal sector limits digital growth and competitiveness

The informal economy in Montenegro is estimated to be as large as 24.5% of GDP.<sup>7</sup> This leaves those businesses that are operating legally and paying taxes disadvantaged relative to those in the grey economy. Yet the challenges of the informal economy remain missing in key strategies and analysis, as does the continuous monitoring of progress in reducing economic informality. The fight to transition informal workers into the formal economy remains modest and a proactive strategy is lacking.

The informal economy flourishes where complex and expensive fiscal procedures, a high financial burden on wages and existing social policy allow employed citizens to receive social welfare benefits.<sup>8</sup> In addition, overly complex fiscal procedures lead to an insufficiently transparent monetary system, inadequately trained and equipped tax administration, lower quality of public-sector services – and a high degree of social tolerance towards the informal economy.

As a serious concern for the economic stability of the country, investors are recognizing the lack of systematic and strict tax collection. Discipline in fiscal matters directly influences the competitiveness of the companies in the market and creates unfair conditions to operate.<sup>9</sup>

Addressing the informal economy requires a strengthening of the efficiency of inspection services, a decrease in labour costs, and an increase in the transparency of doing business, including through digitalization in both the public and private sectors.<sup>10</sup> Reinforcing labour inspections and establishing reliable, regular statistics and diagnostic tools remain vital.<sup>11</sup> While in 2018 the Government of Montenegro established a national commission to fight the informal economy, the outcomes of its work are yet to be seen.

A promising way to address the informal economy is to support the growth of a sharing economy: a model where values are exchanged directly between producers and consumers, mediated by information technology platforms. In Western Balkans countries, including Montenegro, the sharing economy holds potential in rural development to share infrastructure and land, to crowdfund innovative solutions, to barter with the help of alternative cryptocurrencies, and to improve rural tourism using platforms such as AirBnB.

In cities, the evolution of a sharing economy can help to increase employment and service availability in transportation through rideshare platforms such as Bolt and Uber. However, to fully benefit, Montenegro should introduce the necessary regulation for safety and taxation. For example, in 2017 Estonia was the first European country that passed the so-called rideshare law. The law introduced flexible regulation that allowed for different business models while still providing a clear legal framework for all rideshare and taxi services.

Our recommendation is to view the issue of the informal economy as a top priority for improving the country's business environment and to create a strategy with a concrete action plan to enforce it. Close cooperation between the central and local authorities is necessary, as well as continuous dialogue between the private sector and the government.

## Which priority sectors and jobs will automation impact?

The automation created by digital transformation will disrupt multiple job sectors in Montenegro. Globally, estimates find that by 2030, the average output per worker will increase by 30% due to automation.<sup>12</sup> But trends also predict that by the mid-2030s, 30% of jobs and 44% of workers with low skills and education levels will be replaced by automation.<sup>13</sup>

Applying the same framework, we can identify the sectors most likely to be impacted by automation in Montenegro (Box 2.2). Accommodation and food services both for people from Montenegro and in tourism will likely see the largest shift in automation – with more than 50% of work being replaced by technology (Table 2.1). Mining, oil and gas extraction, utilities and agriculture are expected to see more than 30% of work automated as well. Within these overall sectors, which specific job categories will be impacted by digital transformation in the labour market? We turn to this question next.

Table 2.1 Expected impact of automation on priority sectors of Montenegro by 2030

Priority sector	The corresponding industry according to Bain (2018)	Expected automation percentage until the year 2030
Sustainable Agriculture and Food Value Chain	Agriculture	36
	Accommodation and food services	51
Renewable Energy Sources and Energy Efficiency	Utilities	39
New Materials and Sustainable Technologies	Mining and oil & gas extraction	46
Sustainable and Health Tourism	Accommodation and food services	51
	Healthcare and social assistance	18

Source: WEF, 2018 and Bain, 2018. Projections of increases in gross output per employee in different industries are based on the global data suggested by Bain (2018).

## Box 2.2 Estimating the economic fallout of automation: more work is needed

This chapter develops a linear-model projection where the input is a change in technology, and the output a proportional change in social complexity. This is a rather simplistic model that is not able to account for variations that we know empirically exist, e.g. periods of stability or sudden advances, unique events, such as natural disasters, virus outbreaks, political upheavals, or even “devolution”.

The advantage of linear models is that they are easy to evaluate, but the greater disadvantage is that they can lead to analyses where the complexity we know exists in the human past is discounted.<sup>85</sup>

For more realistic projections of impacts of automation on specific job categories, more complex models capable of catering for non-linear processes, such as regression analysis<sup>86</sup> or in particular agent-based models<sup>87</sup>, would be required. Creating such models highlights further areas for research.

## One in two jobs in Accommodation and Food Services at risk of automation

Based on projections globally, we can estimate the likely impacts to specific job categories in Montenegro (Table 2.2).

- **Elementary occupations and clerks at risk of automation soonest.** Clerks of all kinds are among the declining and soon-to-be-redundant jobs, as their functions are the easiest to automate.<sup>14</sup> Jobs that will likely be made increasingly redundant in the period 2018–2022 across all industries are routine-based, medium-skilled white-collar roles that are susceptible to advances in new technologies and process automation. These shifts reflect the unfolding and accelerating trends that have evolved over recent years – continuing developments that have impacted roles in retail banking (ATMs), consumer sales (self-checkout kiosks) and other sectors.<sup>15</sup> The share of these jobs is expected to decline until 2022 by 3%–18%, depending on the industry. In the Montenegrin context, employees holding jobs in the job role category of Elementary Occupations and Clerks jointly make up 16.6% of all the people employed. The work of a large share of clerks in the public sector will likely be automated by electronic public services.
- **Technicians and other lower-level professionals.** The second-fastest declining category of jobs is technicians and other lower-level professionals. The demand for technicians in the Information & Communication Technologies industry will decrease from 34% in 2018 to 24% in 2022.<sup>16</sup> The Infrastructure, Energy, and Mobility industries have already since 2013 experienced a decreasing relative demand for technicians of various kinds.<sup>17</sup> However, automation will certainly create some new job categories, such as robot repair technicians, that will grow rapidly (Bain, 2018). The declining need for technicians and other lower-level professionals relates to an additional 12.2% of the current employees in Montenegro.
- **Machine operators and assemblers.** This job category will likely remain stable or begin declining, depending on the industry. In Montenegro, the most relevant roles in this category are power plant operators in the industry of Energy Utilities & Technologies and mining plant operators in the Mining & Metals industry. Both roles are declining because of automation: power plant operators from 34% in 2018 to 24% in 2022, and mining and plant operators from 40% in 2018 to 32% in 2022. The share of the job role of plant and machine operators and assemblers is 7.2% in Montenegro.

- **Market, sales and service workers.** Making up almost a quarter (23.2%) of all the people employed in Montenegro, these job roles leverage distinctively ‘human’ skills and are expected to grow.<sup>18</sup> Accordingly, within this job category, Sales and Marketing Professionals and Sales Representatives in Wholesale and Manufacturing for Technical and Scientific Products, are stable or new job roles, depending on the industry. They are expected to experience an increase in demand across different geographies and industries over the 2018–2022 period. In the industries relevant for Montenegro, the Sales and Marketing Professionals job role is expected to grow in the employment sectors of Montenegro.
- **Sales and Purchasing Agents and Brokers.** This job type will likely become a redundant job role that declines in the Aviation, Travel & Tourism industry from 25% in 2018 to 14% in 2022 and in the Chemistry, Advanced Materials & Biotechnology industry from 25% in 2018 to 19% in 2022. Both industries are relevant for Montenegro. Also, the job role Client Information and Customer Service Worker is declining in the employment sectors of Montenegro.
- **Professionals.** The job category of professionals is very broad, comprising 18.9% of the employees in Montenegro. The criterion for deciding if a job should be considered a professional one is the level of learning required. If the job customarily requires a Bachelor’s, Master’s degree or PhD, it is considered a professional job. These jobs typically require at least four to eight years of tertiary education.<sup>19</sup> To develop the skills and experience necessary for a mid-level or top position, graduates will need 10 years of work experience. Employees belonging to the job category of professionals are also ultimately those providing services in the Professional Services industry.<sup>20</sup>

Table 2.2 Automation rates and shares of employees in different industries in Montenegro

Industry	Automation rate (%)	Share of employees in Montenegro (%)
Manufacturing	55	6.5
Accommodation and food service activities	51 <sup>21</sup>	8.4
Wholesale and retail trade, repair of motor vehicles and motorcycles	Retail trade: 49 <sup>22</sup> , Wholesale trade: 34 <sup>23</sup>	19.7
Transport and storage	46 <sup>24</sup>	6.1
Mining and quarrying	46 <sup>25</sup>	0.7
Electricity, gas, steam and air conditioning supply	39 <sup>26</sup>	1.5
Water supply, sewage, waste management and remediation activities	39 <sup>27</sup>	2.7
Agriculture, forestry and fishing	36 <sup>28</sup>	1.0
Construction	32	6.3

Industry	Automation rate (%)	Share of employees in Montenegro (%)
Information and communication	32	2.8
Other service activities	28 <sup>30</sup>	2.2
Administrative and support service activities	27 <sup>31</sup>	6.0
Arts, entertainment and recreation	27	2.8
Financial and insurance activities	25 <sup>32</sup>	2.2
Professional, scientific and technical activities	25 <sup>33</sup>	4.6
Public administration and defence, compulsory social security	21 <sup>34</sup>	11.5
Human health and social work activities	18 <sup>35</sup>	6.6
Real estate activities	16 <sup>36</sup>	0.8
Education	10 <sup>37</sup>	7.6

Source: Based on WEF, 2018 and MONSTAT, 2019b

### Emerging digital transformation job roles

While existing jobs may undergo change, digital transformation will also accelerate a shift into a new world of working opportunities. Digital roles will emerge in a process mirroring the decline in current job roles: while clerks and other elementary occupations are on the decline, high-skilled professionals will continue to take centre stage (Table 2.3). This shift can increase the average output of workers in emerging Professional Service roles by up to 25% between 2015 and 2030.<sup>38</sup>

Table 2.3 Emerging digital technology job roles in Montenegro

Job role	Industry
Data Analysts and Scientists; Big Data Specialists	Aviation, Travel & Tourism; Chemistry, Advanced Materials & Biotechnology; Energy Utilities & Technologies; Global Health & Healthcare; Information & Communication Technologies; Mining & Metals; Consumer (including Agriculture and Retail Trade); Professional Services; Infrastructure (including Construction)
AI and Machine Learning Specialists	Aviation, Travel & Tourism; Chemistry, Advanced Materials & Biotechnology; Energy Utilities & Technologies; Global Health & Healthcare; Information & Communication Technologies; Mining & Metals; Consumer (including Agriculture and Retail Trade)

Job role	Industry
Sales and Marketing Professionals	Aviation, Travel & Tourism; Chemistry, Advanced Materials & Biotechnology; Information & Communication Technologies; Mining & Metals; Consumer (including Agriculture and Retail Trade); Infrastructure (including Construction)
Organisational Development Specialists	Chemistry, Advanced Materials & Biotechnology; Energy Utilities & Technologies; Mining & Metals; Consumer (including Agriculture and Retail Trade); Professional Services; Infrastructure (including Construction)
New Technology Specialists	Chemistry, Advanced Materials & Biotechnology; Energy Utilities & Technologies; Information & Communication Technologies; Mining & Metals; Consumer (including Agriculture and Retail Trade)
Innovation Professionals	Aviation, Travel & Tourism; Chemistry, Advanced Materials & Biotechnology; Energy Utilities & Technologies; Information & Communication Technologies; Professional Services
Software and Applications Developers and Analysts	Aviation, Travel & Tourism; Energy Utilities & Technologies; Information & Communication Technologies; Infrastructure (including Construction)
User Experience and Human-Machine Interaction Designers	Aviation, Travel & Tourism; Information & Communication Technologies; Consumer (including Agriculture and Retail Trade); Infrastructure (including Construction)
General and Operations Managers	Aviation, Travel & Tourism; Chemistry, Advanced Materials & Biotechnology; Mining & Metals; Consumer (including Agriculture and Retail Trade)
Process Automation Specialists	Energy Utilities & Technologies; Mining & Metals; Professional Services; Infrastructure (including Construction)
Information Security Analysts	Aviation, Travel & Tourism; Information & Communication Technologies; Infrastructure (including Construction)
Information Technology Services Specialists	Global Health & Healthcare; Consumer (including Agriculture and Retail Trade); Professional Services
Digital Transformation Specialists	Energy Utilities & Technologies; Professional Services
Supply Chain and Logistics Specialists	Global Health & Healthcare; Mining & Metals
Training and Development Specialists	Consumer (including Agriculture and Retail Trade); Professional Services
Research and Development Officers	Chemistry, Advanced Materials & Biotechnology
Renewable Energy Engineers	Energy Utilities & Technologies
Biologists and Geneticists	Global Health & Healthcare
Environmental and Occupational Health and Hygiene Professionals	Global Health & Healthcare
Administrative and Executive Secretaries	Global Health & Healthcare

Job role	Industry
Specialist Medical Practitioners	Global Health & Healthcare
Blockchain Specialists	Information & Communication Technologies
Systems Engineers	Mining & Metals
E-commerce and Social Media Specialists	Consumer (including Agriculture and Retail Trade)
Regulatory and Government Associate Professionals	Professional Services
Contract-Workforce Managers	Professional Services
Robotics Specialists and Engineers	Infrastructure (including Construction)

Source: Compiled by the lead author based on WEF, 2018 and S3, 2018

### But not all groups will be impacted equally

Approaches to measuring the impact of automation are divided into those where entire occupations will be displaced by machines<sup>39</sup> and those where specific tasks within the job roles will be affected.<sup>40</sup> The latter approach emphasizes that the degree of automatability of job roles depends on the tasks that workers perform for these jobs, and how easily these tasks themselves can be automated.

Applying the occupation-based approach results in significantly higher assessments of risk to automation compared with the task-based approach.<sup>41</sup> The differences can be great: 47% of job roles in the United States are likely to become automated based on the occupation-based approach,<sup>42</sup> whereas the task-based approach finds just 9% at risk.<sup>43</sup>

Regardless of the approach, it is widely agreed that automatability is lower for those job roles that require higher education, that require cooperation with other employees or where people spend more time influencing others.<sup>44</sup> On the other hand, automatability is higher for job roles with a high share of tasks that are related to exchanging information, selling products or that require physical activity.

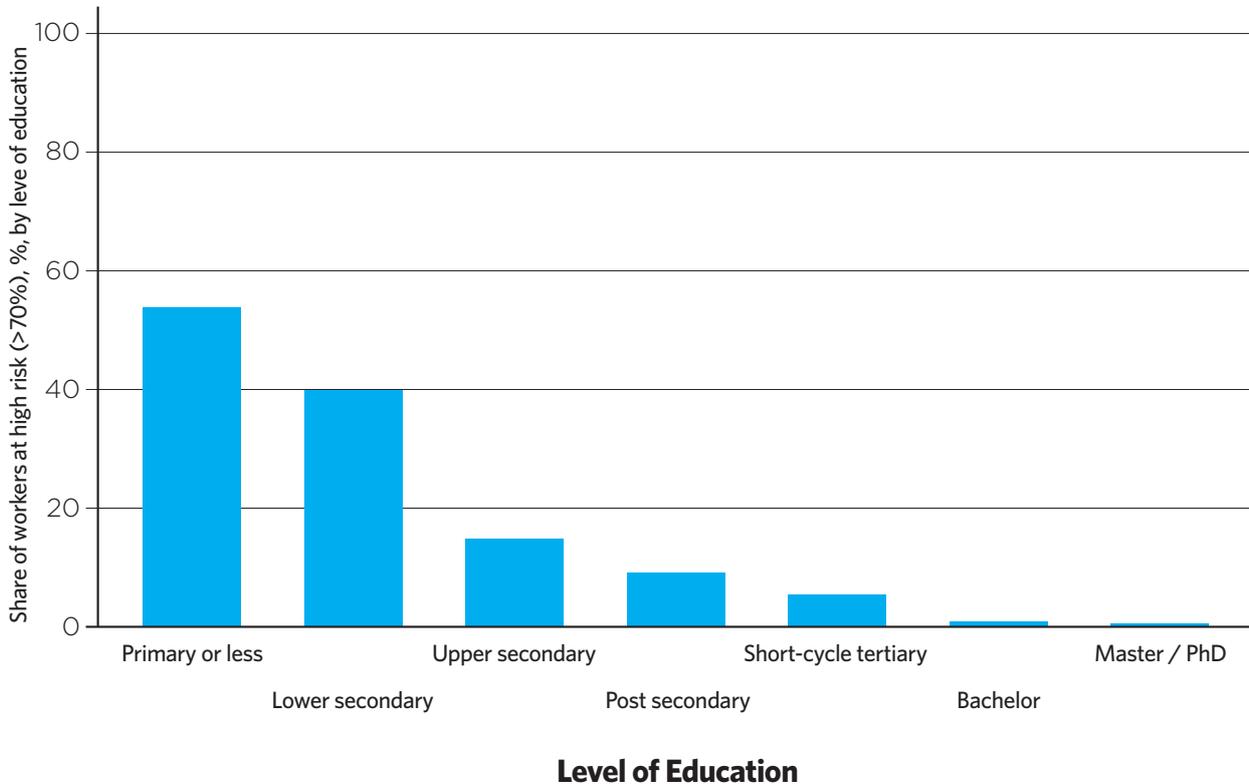
Automatability is also lower in countries already investing substantially in ICT.<sup>45</sup> For example, the share of workers whose job roles will be automated with the probability of at least 70% is highest in Germany and Austria (12%), while it is lowest in Estonia and South Korea (6%). The reason is that Estonia and South Korea are already investing a relatively high percentage of their gross domestic product in the ICT sector, relative to Germany and Austria.<sup>44</sup> This makes the encouragement of the ICT sector development a critical resilience factor.

Despite the differences, a common cross-country feature remains: automatability strongly decreases in correlation with a worker's level of education. Low-skilled individuals primarily face a high risk from automation (Figure 2.6). Adoption of new technologies will increasingly result in socio-technical systems where tasks performed by machines and workers will complement each other within existing or emerging job roles.<sup>46</sup> As an example, tasks involving the monitoring of machines are likely to gain in importance and therefore workers should be trained for such tasks.

However, as we saw in Chapter 1, among citizens with only primary or lower education, the belief dominates that robots cannot replace people in their professions. This, in turn, leads to the lowest interest among the least educated citizens in the labour market in gaining competitiveness by increasing their digital skills. Therefore, we can conclude that the answer

to overcoming the digital divide in Montenegro lies in education, and particularly in adult and continuous education. Education as an engine of digital Montenegro is explored next.

Figure 2.6 Workers with only lower secondary or lower education levels at the highest risk from automation



Source: OECD, 2016

## Digital transformation and businesses: untapped and under-resourced

Montenegro’s private sector is small. It employs 60% of workers, but over 20% of the jobs are in seasonal tourism and agriculture.<sup>47</sup> While in most higher-income economies large companies account for the lion’s share of revenue as they leverage economies of scale, this tenet does not hold in Montenegro. Companies with over 250 employees contribute only 29% of the gross value added by the enterprise sector. By contrast, large companies contribute between 36% and 47% in Croatia, Slovakia and Slovenia.<sup>48</sup>

Although Montenegro implemented privatization of state-owned enterprises (SOEs), the remaining ones hold a large share of the labour and often burden public finance and block productivity. SOEs in Montenegro account for roughly 25% of formal jobs and about 20% of total jobs – nearly twice as high as the rate in Serbia which is 11%.<sup>49</sup> The large presence of SOEs negatively impacts the business environment, causing distortions in production factors and deterring private-sector investments.

Montenegro ranks 50<sup>th</sup> out of 190 economies in the World Bank’s 2020 *Doing Business Report*.<sup>50</sup> Renewed action to attract foreign direct investment and other resources to spur digital work and the management of risks in new digital roles is needed (Box 2.3).

### Box 2.3 Strengthening foreign investment for digital growth in Montenegro

Foreign direct investment (FDI) can serve as a tool to accelerate economic growth, including the growth of the ICT sector in Montenegro. But unlike Serbia and Croatia, attracting foreign (ICT) companies to the country has proved more challenging. Inflows of FDI have constituted a significant part of GDP in the past decade. In Montenegro, FDI contributes on average 18% annually to GDP, but this figure is low compared to EU members – with the highest inward FDI patterns in Czech Republic (72%) and Hungary (67%).

Montenegro provides a range of incentives to foreign investors including tax breaks in less developed parts of the country, employment subsidies in business zones, a range of small business support programmes, and encouraging competition between local governments that results in a bidding war offering low taxes and local fees.

While these incentives support foreign and domestic investment in tourism, manufacturing, energy and agriculture, they prove to be limited in cultivating the talent, infrastructure and transparent business environment needed to encourage ICT sector development.

A range of actions can help Montenegro meet investors' expectations including:

- Safeguarding public-sector transparency, including an impartial system of courts and law enforcement. Ensuring that rules and their implementation rest on the principle of non-discrimination between foreign and domestic enterprises and are in accordance with international law.
- Putting in place adequate frameworks for a healthy competitive environment in the domestic business sector.
- Removing obstacles to international trade.
- Readdressing those aspects of the tax system that constitute barriers to FDI.

Source: MFIC, 2019; CEE Institute, 2019; OECD, 2003

### Encouraging digital job creation in small and medium-sized enterprises

Small and medium-sized enterprises (SMEs) are the backbone of Montenegro's economy. Nearly 70% of value added and more than three-quarters of national employment is generated by SMEs, compared with an average of 57% and two-thirds respectively in the EU.<sup>51</sup> Yet few SMEs play significant roles in creating jobs in Montenegro. Identifying them and assessing the constraints that are holding back the rise and performance of these high-growth companies are critical in order to realize their full potential and grow the nation's economy.

Global experience proves to be salient. In the United States, most net employment gains between 1980 and 2005 derived from companies less than 5 years old. Without start-ups, the average annual net employment growth rate would have been negative during this period.<sup>52</sup>

In Montenegro, ICT and construction-sector SMEs show the fastest growth – accounting for 8.1% of ICT companies and 6.6% in construction.<sup>53</sup> In terms of output and employment growth, high-growth companies in services outperform those in manufacturing. To achieve fast, quality job creation, it is important to focus on high-growth companies in the ICT industry.

## Generating high-growth digital innovation

High-growth entrepreneurship is unique in that it uses specialized talents – ranging from engineers and scientists to business managers and marketers – to commercialize radically innovative ideas. Yet few enterprises in Montenegro are working on innovation, knowledge and modern technology.<sup>54</sup> Deepened cooperation between enterprises and scientific research institutions, however, could prove pivotal to generate demand for services, innovation in goods and services, and strengthening business procedures, organization and marketing.

In Montenegro, gross domestic expenditure on research and development (R&D) amounts to only 0.5% of GDP as of 2018, with the majority generated by the government.<sup>55</sup> This remains below the target of 0.6% of GDP set for 2020 – and significantly below the EU average of 2%.

To maintain momentum in this direction, Montenegro has adopted the Smart Specialization Strategy 2019–2024 as a new development strategy that foresees a holistic approach to growth based on research and innovation. Under this strategy, ICT is positioned as a key enabler for modernization of the economy. The strategy will be implemented by several ministries, under the governance of the newly established Council for Innovation and Smart Specialization.

Creation of a separate institution – the Innovation Fund of Montenegro – as the main implementing body for the strategy is prescribed by the new Law on Innovation Activity, adopted in July 2020. On the same day, another new law – the Law on Incentives for Development of Research and Innovation – was adopted, which will push forward innovation, including fast-growing and export-oriented ICT activities, but will also stimulate an increase in private investments, innovation infrastructure and start-ups.<sup>56</sup>

Universities are also proving to be limited as sites for innovation. While employing most researchers in the country, they remain oriented towards teaching. And businesses employ fewer than 8% of all people engaged in R&D, with the share of researchers even lower. All this results in a limited environment for the production of scientific results and technologies.<sup>57</sup>

The Economic Reform Programme for Montenegro itself rarely mentions ICT.<sup>58</sup> A core explanation: most government incentives and subsidies aim to increase employment, but digitalization reduces rather than increases the number of employees, except at the time of the COVID-19 crisis, when digital means have become essential for continuing to perform everyday work for many employees.

But, in the longer term, digital transformation will generate new employment opportunities that require employees with a high proficiency in ICT. New incentives and subsidies should include the requirement to introduce new innovative digital solutions – and serve as a management tool to allow for gradual transformation in the nature and type of jobs, paired with development of necessary skills.

Introducing such incentives is the purpose of the newly adopted Law on Incentives for Development of Research and Innovation. In addition, plans are under way to include ICT in the new Economic Reform Programme for Montenegro for 2021–2023.<sup>88</sup>

To support the emergence of high-growth, competitive companies capable of exporting their goods and services, from which many sectors of the Montenegrin economy can benefit, the Government of Montenegro can aim to create a strategy and action plan to increase R&D spending. Proactive government support policies are needed to help companies grow, upgrade and develop new products and services for export. This includes facilitating productivity, upgrading and adopting technology, improving innovation support mechanisms, promoting

entrepreneurship, improving investment and export promotion policies and services, and facilitating access to finance.<sup>59</sup> Achieving all of this is also the purpose of the Law on Incentives for Development of Research and Innovation.

Moreover, an R&D strategy coupled with the broader, holistic approach of the Smart Specialization Strategy (S3, 2018) can support an environment that increasingly incentivizes innovation. As discussed in the next chapter, skilling the workforce through revitalized education programmes in universities and IT academies, as well as the involvement of students in hands-on projects, can create unique opportunities for Montenegro to offer digital solutions to the global marketplace.

### Kick-starting the start-up ecosystem

Start-ups are often mixed up with SMEs, but a significant distinction separates them: SMEs generate revenue early on, embark on a path of slow and steady growth, and tend to focus on providing a livelihood for business owners; meanwhile, start-ups tend to raise venture capital early on and focus on grabbing market share. Even if these are two sides of the same coin, start-ups hold significant potential to accelerate digital transformation in the world of work in Montenegro.

Indeed, the largest opportunities to orient digital companies towards foreign markets lie in supporting Montenegro's start-up ecosystems.<sup>60</sup> But the starting point is limited: experts are not succeeding in finding a supportive business environment. Various barriers must be overcome:

- Inadequate knowledge on how to establish effective start-ups, with existing policies and investments geared towards different objectives.
- A lack of financial and mentoring support that would minimize the risk and increase the chances of success.
- There are credit lines, but they are not sufficiently adapted to the needs of start-ups.
- There are no co-working spaces helpful to building a community of start-ups.
- Montenegro is ranked 50th out of 190 countries on the overall Doing Business ranking developed by the World Bank. However, processes measured by the "Starting a Business" sub-indicator are not as efficient as they should be, indicated by the country's low ranking of 101st on this measure, and this area is hampered by the extensive number of procedures and days required to register a firm.<sup>61</sup>
- A limited digital infrastructure impedes online payments and transactions. PayPal, for example, does not support receiving and withdrawing funds in Montenegro. According to the Ministry of Science<sup>62</sup>, the solution is being developed and should be available for customers in 2020.

In Montenegro, several organizations have devoted resources and energy to supporting start-ups and promoting a start-up culture in the country. While the shared view of several of their representatives remains that a very low level of entrepreneurial spirit exists in Montenegro, they are gaining valuable lessons and inspiration for accelerating their adoption (Box 2.4). The Ministry of Science has demonstrated support from the public sector and created a Programme for Supporting Innovative Start-Ups in 2019–2021.

## Box 2.4 Lessons from innovators: Digitalizuj.me, Tehnopolis and M:tel Digital Factory

NGO Digitalizuj.me is focusing on education through conducting workshops, consulting and technology marketing. It is a digital community, part of which is a start-up community. Digitalizuj.me also includes start-up accelerators. It aims to instil an entrepreneurial spirit from an early age.

Tehnopolis is an innovation and entrepreneurship centre that was opened by the government in 2016. Tehnopolis cooperates with most actors in Montenegro's emerging start-up ecosystem, including the Montenegrin Ministry of Science, by fostering ideas and offering successful start-ups support in the forms of financing, including in using crowdfunding. Tehnopolis offers free co-working space for 24 residents – start-up companies – in virtual incubators, where they are also supported by mentoring. Critics point to a pattern of high promotions but limited results that can be accelerated. Tehnopolis led the first pre-acceleration programme BoostMeUp in 2020 and incubated two mature start-ups: Uhura and The Badger.

M:tel Digital Factory defines itself as an enabler for start-ups. Founded in 2017 by Telekom Serbia and M:tel Banja Luka, Digital Factory offers free co-working space for start-ups. Digital Factory employs tutors who are employed by other companies – they provide guidance to start-ups. As venture capital is not present in Montenegro, Digital Factory contacts angel investors from abroad. It aims to cultivate e-learning, telemedicine, Smart Cities, and a new generation of Customer Relations Management and Data Warehouse Service systems. An extensive e-learning project is currently being conducted with UNICEF and the Police Department of Montenegro. Digital Factory's projects are mixed – both commercial and educational. It is also cooperating with Montenegro's banking industry.

The Government of Montenegro and University of Montenegro established the Science and Technology Park (STP) in 2019. It employs five people, while construction works for a 14,000 m<sup>2</sup> building are under way on the university campus. The building will open at the end of 2021. The STP already serves as a strong enabler of the innovation system in the country.

In the view of the representatives of Digitalizuj.me, M:tel Digital Factory and Tehnopolis, the key issues hindering start-up companies in Montenegro include:

- Secure job mindset – entrepreneurial spirit should be taught from an early age.
- Inadequate progress in digital transformation and the digital economy.
- Lack of a skilled workforce and limited access to professional knowledge and skills.
- Pilot investments in the public sector act in isolated silos.

In response to a recent call for innovative projects by the Ministry of Science, 70% of project applications came from the ICT sector. The high number of applications from the ICT sector can be explained by drastic improvements in the ICT infrastructure in recent years, which supports the development of the ICT sector by attracting foreign companies and digital nomads. This provides fertile ground for further incentivizing ICT sector-specific start-ups.

### Attracting digital nomads and freelancers

Digital nomads are individuals who achieve location independence by conducting their work in an online environment, transferring this independence to mobility by not consistently working in a designated personal office space but by using the possibility to work and travel simultaneously.<sup>62</sup> Being a digital nomad can lead as far as to having no permanent residence.

Digital nomadism can be viewed from tourist and business perspectives. From the tourist perspective, the most important factors affecting digital nomadism in a country are a fast mobile broadband connection and comfortable spaces for working and accommodation, as well as necessary regulations enabling citizens of other countries to easily obtain a digital nomad visa and establish tax residency. According to the survey conducted by the WYSE Travel Confederation in 2017, among more than 57,000 young travellers, 0.6% of the respondents reported themselves as a 'digital nomad' rather than other traditional travel identities such as 'backpacker' or 'tourist'.<sup>63</sup> These 0.6% of young travellers represent about 1.8 million international trips per year.

From a business perspective, countries are competing to attract e-residents who could become physical residents. Estonia, for instance, plans to introduce a digital nomad visa targeted at e-residents of Estonia and it is among the first countries in the world to enable digital nomads to apply for a visa for remote work.<sup>64</sup> By simplifying digital identity and status which facilitates access to the Estonian ecosystem of digital services for businesses, e-residency enables digital entrepreneurs to start up and manage an EU-based company from anywhere, entirely online, and with access to international payment service providers.<sup>65</sup> E-residency is targeted at digital nomads, freelancers, start-up companies and digital entrepreneurs.<sup>66</sup> E-residents have established more than 6,000 companies in Estonia bringing in an annual tax revenue of €10+ million.

The Ministries of Science and the Economy of Montenegro plan support for freelancers to establish companies and encourage digital nomads to move to the country. The purpose of the first initiative is to encourage freelancers working for foreign companies in Montenegro to start their own companies in Montenegro. The government wants to support such companies by creating attractive conditions for them.

The second initiative is concerned with supporting innovative start-up companies by introducing regulations and creating living conditions for digital nomads. The regulation – the Law on Incentives for Development of Research and Innovation – was adopted in 2020 and will be implemented by the beginning of 2021.

Establishing a digital business ecosystem would enable ease of registration of a company online and to digitally manage e-commerce, taxation and other operations. Combined with ease of living, networking, and community development and a safe environment and pleasant climate, an effective digital business ecosystem could provide Montenegro with a cutting-edge competitive advantage. Furthermore, to make Montenegro a haven for digital nomads and freelancers, achieving harmonization with international payment processors such as PayPal and Stripe is essential.

## Montenegro citizenship by investment

A further tool already available is the Citizen by Investment Programme of Montenegro, a new economic citizenship scheme that has been available since October 2018 for foreign investors. The decision came into force on 1 January 2019 and will apply until December 2021, whereby foreigners can be granted citizenship through a designated investment. Through the scheme, applicants donate a grant to the government and invest in development projects that create jobs in the country.

This can be linked to e-residence and could serve as a step forwards for potential foreign investors in Montenegro and ease access to registering businesses in the country. As discussed above, Estonia has this tool to expand its development and tax revenue base.

## ICT industry as an enabler of digital transformation

The elements of digital transformation include worker enablement, digitally modified businesses and new digital businesses.<sup>67</sup>

- **Worker enablement** virtualizes individual-level work by separating the work process from the location of the work. For example, a medical doctor does not need to work on the site of a health tourism resort but can be consulted online by a middle-level healthcare professional, such as a nurse, whenever necessary.
- **Digitally modified businesses** augment physical products with digital offerings and usage of ICT to share content. For example, the market for medicinal herbs, organic food and food supplements produced by a biomedical company can be considerably extended by selling them online through an e-commerce platform.
- **New digital businesses** introduce digital products that complement traditional products. For example, blockchain technology enables a new business model for sustainable tourism in a sharing economy where the mediators are replaced by a distributed platform that is collectively and in a trustworthy manner managed by all participants of the network of sustainable tourism providers and destinations.

Central to these and other elements of digital transformation is the application and development of ICT. This essentially complies with the Smart Specialization Strategy for Montenegro, where ICT has been defined as a horizontal sector that provides information and technology support to the following vertical priority sectors:<sup>68</sup>

- Sustainable Agriculture and Food Value Chain.
- Renewable Energy Sources and Energy Efficiency.
- Sustainable and Health Tourism.

In each sector, digital transformation by means of ICT holds the potential to enhance worker enablement and introduce digitally modified and new digital businesses. Moreover, as identified in this chapter, job roles in ICT dominate the list of prospective and emerge digital roles in Montenegro through to the year 2030.

### ICT sector barriers...

Currently, ICT employees make up 2.8% of the total number of employees in Montenegro.<sup>69</sup> The EU-28 average for total ICT employment is 3.7%, although some member states, such as Finland, Sweden and Estonia, outperform on this benchmark. The ICT industry is one of the largest suppliers of high-paying jobs in Montenegro, with a significant wage gap between private- and public-sector ICT specialists. The sector has enjoyed stable jobs growth since 2010. Despite a relatively low number of employees, ICT currently accounts for 6% of GDP in Montenegro – and is continuing on an upward trend.<sup>70</sup>

In contrast to other economies, telecommunications is driving growth in the ICT sector in Montenegro. In developed countries, IT and software businesses typically lead the industry. But with fewer than 300 IT companies developing software in Montenegro, turnover is just a fraction of telecommunications companies.<sup>71</sup> Moreover, the ICT market focuses on providing services to the domestic market, with customers primarily in the public sector.

As a service sector, the initial investment and resources to get started remains low. Moreover, products and services are inherently portable, with low barriers to export relative to other sectors.<sup>72</sup> Based on interviews with university representatives in Montenegro, computer science

graduates remain in high demand and easily find jobs upon graduation. In fact, anecdotal evidence finds that most second- and third-year students already fully employed.

The key challenge hindering growth in the ICT sector continues to be inadequate IT and computer literacy, a lack of skills, a lack of institutionalized assistance by the government to the ICT industry, limited e-government services and little export promotion assistance. Mentorship programmes and international networking can break these barriers and the government has the power to support the industry with such initiatives.<sup>73</sup>

Within the Western Balkans, Montenegro's ICT sector exhibits a lower annual growth and share of the economy than Croatia's and Serbia's. Montenegro's ICT industry is generally perceived as the least competitive, with multiple limitations.

- **Small size of the Montenegrin market.** With the smallest population in the region, Montenegro attracts fewer foreign investors, de-incentivizing domestic ICT company growth.\*
- **State-oriented market structure.** As companies in Montenegro's ICT sector typically service the domestic market, the government is their largest customer.
- **Low investment.** Government investment in the ICT sector is among the lowest in the region and far below the European Union average. Current allocation levels are proving to be insufficient to encourage research and development in ICT.<sup>74</sup>

### ...and how to overcome them

By contrast, most experts agree that the Croatian ICT industry stands out as the strongest, with several lessons to draw on to accelerate growth in the ICT industry in Montenegro (Box 2.5). Several of the measures to support the ICT sector have already been implemented or are in the process of implementation.

#### Box 2.5 Regional lessons to accelerate ICT sector expansion in Montenegro

How did the ICT industry develop in Croatia? Multiple differences are in place:

- ICT is recognized as one of the national priorities.
- Many ICT clusters for start-ups and small companies help them to survive in the market.
- A policy exists to fund research and development.
- Introduction of the e-Croatia programme, focusing on e-government and e-commerce.
- Establishment of the One-Stop-Shop Programme, enabling Croatian entrepreneurs to register businesses within 24 hours.
- Establishment of the Croatian Institute of Technology to support and direct Croatia's developments, advise and support intellectual property and technology transfers, and to fund and implement ICT projects.

\* However, the small number of inhabitants alone is not a serious reason why the ICT industry cannot succeed, as is proven by the example of another small country in Europe – Estonia, which has only 1.3 million inhabitants.

Looking at Serbia, the following measures have been taken to enhance the ICT industry of that country:

- Improvement of innovation infrastructure, including the establishment of two science technology parks.
- Establishment and development of regional start-up centres in eight cities and municipalities of Serbia.
- Introduction of tax incentives for innovative start-up companies that are active in the area of knowledge economy.
- Introduction of a programme for supporting and promoting women in innovative entrepreneurship.
- Introduction of a programme for providing support for the opening of regional innovation start-up centres.
- Introduction of an incentive for the development of electronic commerce.

Source: FIT, 2014; 2017; CIEIT, 2019

Building on regional best practices and Montenegro's ICT environment, the range of opportunities to overcome the barriers facing the sector includes:

- Establish ICT as a vertical priority area instead of a horizontal one;
- Develop sector-tailored strategies and state-level stimulus policies aimed at the development of the ICT sector;
- Project and promote the digital economy as a way of achieving higher productivity, competitiveness and convergence with the EU economies. Facilitate networking of businesspeople within the ICT sector;
- Revise the current educational programmes in ICT at all levels and improve the quality of training of graduates from ICT faculties;
- Increase funds allocation from the state budget to encourage research and development.

## Managing the economic fallout – and opportunities – of digital transformation

Multiple opportunities and costs will result from increasing automation and emerging work under digital transformation. This section details the likely impacts on incomes and salaries, productivity in specific sectors, informal work and groups acutely vulnerable to digital change.

### Automation will widen income inequalities...

As automation unfolds in Montenegro, incomes will be reshaped – widening income inequalities for low-income, low-skilled and uneducated workers.<sup>75</sup> Workers in medium- to low-skill roles who rely on physical labour or skills vulnerable to automation are at higher risk of losing their jobs or of facing declining wages. In addition to job losses and lost income, automation may also increase income inequality by increasing the share of income going to profits as opposed to wages.

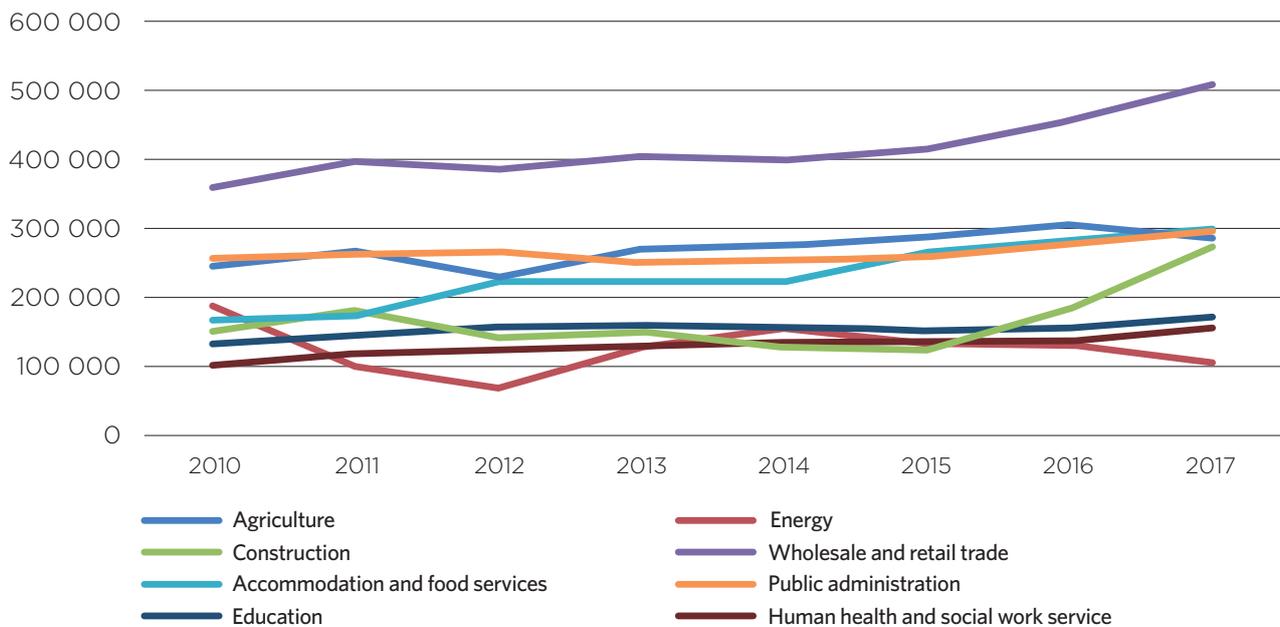
High levels of inequality in a society effectively constrain growth by limiting effective demand. The inability to meet increased technological innovation capacity to offer good and services with effective demand may ultimately reduce growth.<sup>76</sup> This turns striving for equality as a goal in and of itself into a priority focus.

While the Montenegrin government and public administration cannot directly stop or inhibit automation, it can still guide the automation process in such a way that it would advance people’s wellbeing and facilitate debate in society. The automation of public administration, public service delivery and the added value from that process are elaborated in the chapter on governance as a part of the Public Service Portfolio Management concept.

**...increase productivity and the number of workers in priority sectors...**

Gross value added (GVA) measures the value of goods and services produced in an area, industry or sector of an economy.<sup>77</sup> In Montenegro, wholesale and retail trade, accommodation and food services, agriculture, and construction dominate the economy (Figure 2.7). Energy is also an important sector of the Montenegro’s economy.

Figure 2.7 Wholesale and retail trade, accommodation and food services, agriculture and construction dominate Montenegro’s economy



Source: MONSTAT, 2019j. Gross value added (GVA) in euros.

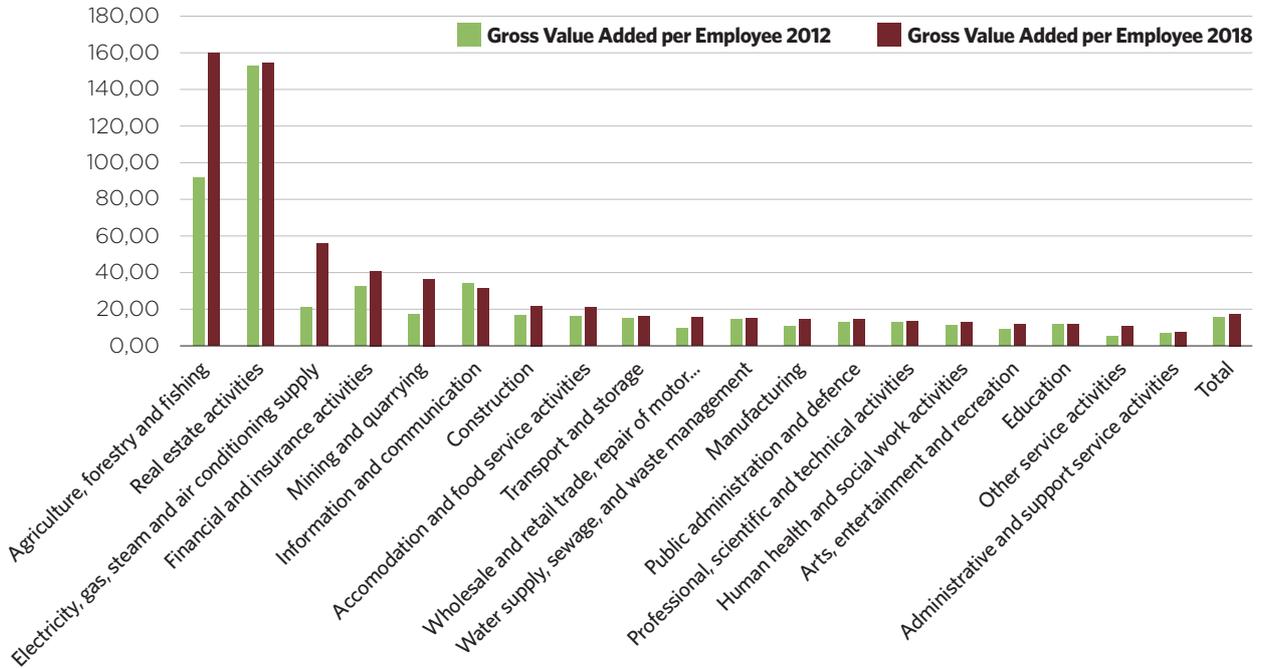
Assessing the GVA per employee (GVA/E) provides insight into shifts in labour productivity. Currently available employment data suggests automation is already increasing productivity in agriculture, financial and insurance activities, mining and quarrying, electricity, gas, steam and air conditioning supply, construction, provision of accommodation and food services, manufacturing, and in the wholesale and retail trade activity sectors (Figure 2.8). This is also visible through the declining numbers of employees in all of these sectors, except for construction and accommodation and food services, from 2012 to 2017.

The increase of employment in the construction and accommodation and food services activity sectors is caused by investment activities and growth of tourism. The numbers of employees have increased also in several other activity sectors, particularly in public administration and defence, education, human health and social work activities, transport and storage, administrative and support service activities, and in professional, scientific and technical activities.

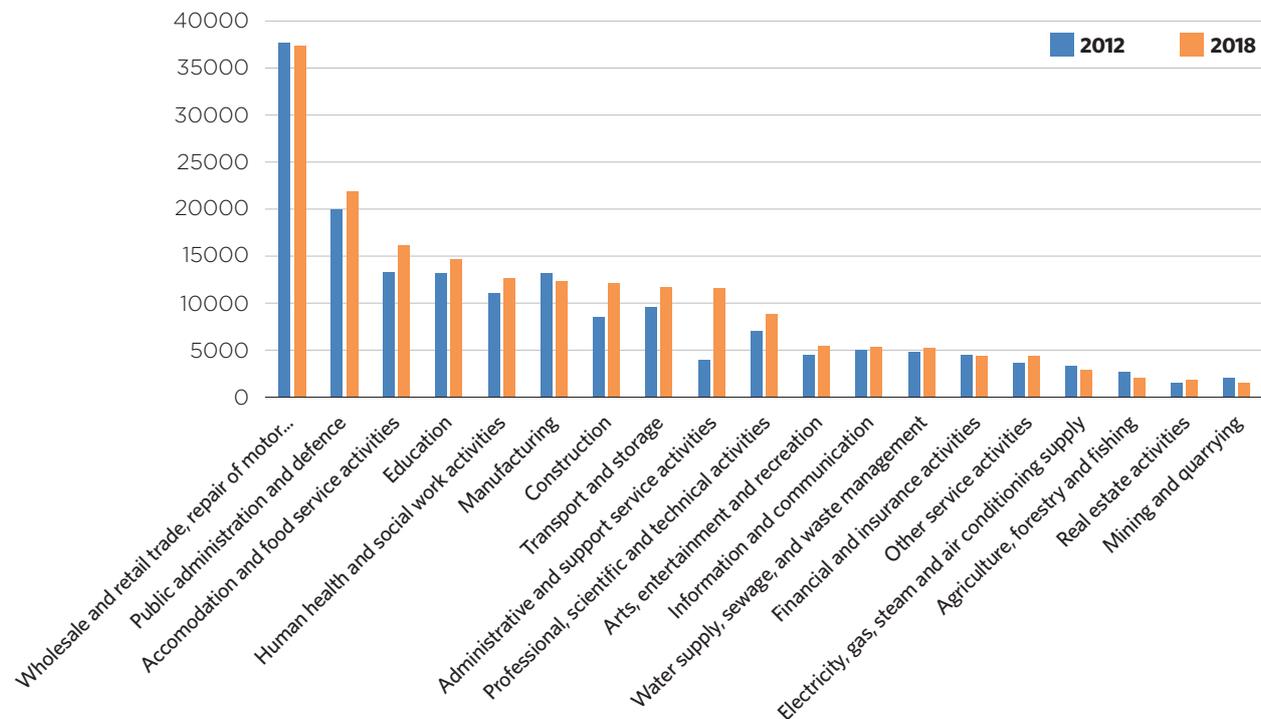
As the increase in these activity sectors is not accompanied by an increase in labour productivity, it seems that too many people are employed in some of these areas, particularly in public administration and defence and administrative and support service activities. This needs to be considered when planning reskilling programmes for employees in Montenegro.

Figure 2.8 Rising productivity and number of employees in priority sectors already under way

(a) Gross value added per employee in thousands of euros



(b) Number of employees by activity sectors



Source: Based on MONSTAT, 2019j and MONSTAT, 2020b.

## ...and generate new risks and opportunities for traditionally vulnerable groups

Already confronting a multitude of economic, legal, and cultural barriers, and despite having overall higher access to the internet, women tend to face significant barriers to technology access. Compounded with the already limited workplace inclusion and unequal salaries, increasing digitalization may exacerbate the digital divide along gender lines. The inequality in access to technology affects professional and personal development for women because they may not have the same opportunities or resources that are provided for men. This constitutes an additional risk for the advancement of digital transformation.

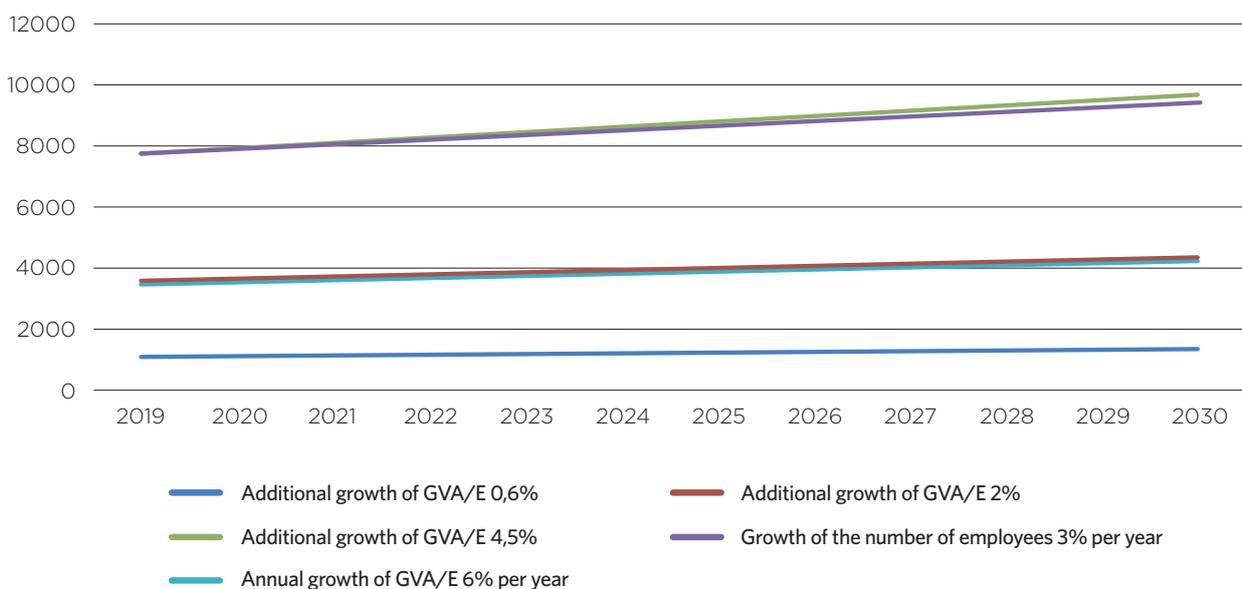
But there are signs of hope. The digital economy has enabled many women to access work that lets them apply their creativity and potential. Many women have moved to e-trading as entrepreneurs or are employed through crowdsourcing or e-services. Even low-income female entrepreneurs in developing countries can now use mobile telephones to gain access to market information and sources of finance. They can also do so flexibly from home.<sup>78</sup>

## How many people will automation displace by 2030?

Adaptation to the potential digital transformation of work in Montenegro requires insight into the scale of impact. As a step in this direction, this report presents a range of scenarios projecting the number of workers at risk of displacement by automation. Depending on various projections, Montenegro should prepare to reskill at least 1,000 and at most 10,000 employees per year, depending on the economic growth, demographic changes, including migration and the rate of automation (Figure 2.9).

Figure 2.9 Between 1,000 and 10,000 mostly low-skilled workers must be reskilled annually by 2030

**The numbers of people to be reskilled in Montenegro in case of different scenarios**



Source: Calculated based on MONSTAT, 2019c. See *Technical note: Methodology for creating automation scenarios* for more details.

## Beyond the economic risks of digital transformation

Early evidence from the digital transformation of advanced economies points to a range of potential economic risks.

- **Rising income inequalities within and across countries:** Additional risks incurred by the digital transformation are inequalities within and between countries because of gaps between the countries' wealth and development, as well as differences in living standards between urban and rural areas. In particular, if the sharing economy remains unregulated, then tax revenue remains under-collected, leading to weaker financing of social security. This could cause countries, regions or social groups to miss out on the positive aspects of digital transformation.
- **Growing surveillance and privacy risks.** Other potential threats brought about by digital transformation are: surveillance, loss of privacy, losses of jobs and tax revenues, as well as behavioural manipulation campaigns which undermine democracy.
- **Cybercrime.** Digital transformation is also accompanied by cybercrime. The global economy lost over US\$600 billion to cyberattacks in 2017.<sup>79</sup> An attack may paralyse the operation of whole economic sectors, threatening national security, the stability of public institutions and personal data. Every day, billions of modern technology users entrust their data to the hands of manufacturers and suppliers, who are at the front line of the battle against cyberattacks, the scale and range of which is constantly evolving.<sup>80</sup>

While early winners and losers will emerge, benefits remain to be reaped, especially during the COVID-19 pandemic context. Digital transformation creates more jobs than it destroys, increasing the demand for high-skilled workers.<sup>81</sup> Indeed, robots complement, rather than substitute for, labour. Equally, automation raises the quality of work and the wages of workers fulfilling the tasks of the future.<sup>82</sup>

Globally, 73% of people believe technology can never replace the human brain.<sup>83</sup> Various analyses conducted on the digital economy and the future of work agree: 'human' skills such as critical thinking, analytical thinking, creativity, originality, negotiation, empathy and persuasion cannot be learned by a machine. This leaves the risk of automation highest for professions that involve a high degree of repetitive tasks.

Technological innovation and digitalization can have a positive effect on human development if they are encouraged and supported by the public sector. New technologies require new skills. Governmental institutions responsible for education policy must be flexible and adaptive to shifting market needs to ensure that Montenegro keeps up with the change – and that no-one is left behind.

The government should not only focus on educating young people, but should also offer training programmes to teach digital skills to older adults and people with disabilities, no matter where they live in Montenegro. When Estonia adopted its e-government, nation-wide training sessions and workshops were offered in public libraries, culture centres and shopping malls. Buses converted into classrooms drove around the countryside to offer basic training in digital skills.

With investments in the infrastructure and well-designed policies that support the growth of SMEs and start-up ecosystems, the people of Montenegro even in the most remote areas can develop the capability to become entrepreneurs. In the world of e-commerce, the physical location of market participants becomes irrelevant. It is in this opportunity that Montenegro's next phase of human development achievements will close down inequalities and offer equal chances for all of enjoying progress.

## Chapter 3

### Education and innovation: twin engines for a digital Montenegro

Here, the report looks at digitalization from the viewpoint of education quality in two distinct senses – how education systems must reform in order to ensure that Montenegro emerges ready for a new digital future, but also how digital transformation can improve the quality of education. The chapter identifies opportunities and challenges for fostering inclusive digitalization, from curriculum reform and digital literacy for all, to education systems that can provide the foundation for a digital future managed for inclusive human development in Montenegro.

Education underpins human development. Despite massive gains in expanding access to education, too often this education is of inadequate quality to fulfil the aspirations people may hold – and to meet economic, social and environmental demands. The promise of digitalization and artificial intelligence (AI) in education is substantial: digital transformation can spur a renewal of the education system to go beyond an industrial, one-size-fits-all model towards the generation of knowledge, learning and creativity that brings about inclusive sustainable development for all.

Digital techniques can be used to support teachers, tutors and administrators to improve the teaching and learning process and make it student-centred and individualized. AI techniques can provide quality personalized learning opportunities at scale and can facilitate the creation of quality content. An accelerated pace of research and innovation is needed to deliver on this promise.

Because of the spread of COVID-19, the Government of Montenegro mandated the closure of all schools and universities on 13 March 2020. Immediately after the closure, the Ministry of Education organized the continuation of teaching via television and the internet. A free-of-charge online platform #UčiDoma (#LearnAtHome) was developed to help teachers and students keep up with the school schedule. In addition, the Ministry of Education prepared an electronic platform for enrolment in kindergartens and primary and secondary schools. According to the survey conducted at the end of March by Ipsos,<sup>1</sup> most parents are satisfied with how the schools and kindergartens have responded to the coronavirus crisis. However, online education is a challenge for children who have no computer or internet access.

This chapter begins by establishing the status and trends across the formal education system in Montenegro. While it touches briefly on some early childhood issues, the analysis focuses on secondary, vocational and tertiary learning. It goes on to assess how research and innovation can drive digital transformation. We will also touch upon how the ongoing COVID-19 pandemic can foster digital innovation in education and research. Throughout, the chapter asks: how can education help the people of Montenegro meet the evolving demands of a digital economy and society, and what is required for digital transformation to usher in a new age of education that advances human development for all in Montenegro?

## Education from early childhood to secondary school

The most effective way to acquire the skills demanded by the changing nature of work and society is to start early. Early investments in nutrition, health, social protection and education lay strong foundations for the future acquisition of cognitive and socio-emotional skills. They also make future acquisition of skills more resilient to uncertainty.<sup>2</sup>

In Montenegro, preschool education covers children up to their enrolment at primary school at 6 years of age. Parents typically enrol children under 3 in nurseries, while children aged 3–6 enter kindergarten classes. In Montenegro, preschool education is delivered in public or private preschool institutions, and most children attend full-day programmes.

Geography and the intergenerational transmission of inequalities, however, delineate lines of education inequality. At 88%, the percentage of children entering preschool education is high in the central and the southern regions, but this drops to just 27% in the northern region.<sup>3</sup> Low population densities and long distances to reach the nearest facility intersects with high poverty and unemployment rates in northern municipalities to exclude children from early childhood education in these areas.

Additionally, a lack of awareness among families of the importance of early childhood education propagates a cycle of limited learning for children. This is intensified in multigenerational families where the grandparents take care of preschool children while the parents work, rather than sending them to preschool.<sup>4</sup> As a result, with 24.9% of children not attending pre-primary education, Montenegro ranks second highest among the countries participating in the Programme for International Student Assessment (PISA) tests in terms of the number of children not attending a pre-primary school.<sup>5</sup>

Preschool education can spell a significant early advantage which perpetuates over the whole lifetime. Analysis of the PISA test results in 34 OECD countries shows a link between preschool attendance and school attainment. Fifteen-year-olds who attended preschool for more than a year, on average, performed better in reading literacy than those with no preschool education. The difference corresponds to 18 months of formal education.<sup>6</sup> Moreover, it is possible to encourage learning of cognitive skills – problem-solving and reasoning – and socio-emotional skills – creativity and curiosity – in children aged 4–7.

The importance of primary and secondary education should not be underestimated for human development in Montenegro because the foundations for creativity, problem-solving skills and computational thinking can be laid before the age of 16.

Given their relative mandates, ample foundations exist to adapt the primary and secondary school curriculum to the emerging digital economy and social needs (Table 3.1). Digital skills should be developed in the earliest stages of schooling, later upgraded through secondary education and specific qualifications could be gained during tertiary education. And given the performance in mathematics, science and reading by Montenegro's young people – there is sufficient scope for strengthening the quality of education using digital tools across the learning system, as well (Box 3.1).

Table 3.1 Secondary and gymnasium school curricula: space for critical thinking and digital skills development

The secondary school curriculum covers:	The gymnasium school curriculum covers:
Acquiring the necessary knowledge, skills, abilities and habits, based on the achievements of science, technology, culture and art in order to continue their education	Compulsory subjects
Achieving an internationally comparable level of knowledge	Compulsory elective subjects
Developing critical thinking and judgment	Mandatory elective subjects
Developing the abilities to communicate and for non-violent conflict resolution	
Developing a responsible attitude towards work and environment and their own health	
Developing the ability to live in a pluralistic and democratic society	
Encouragement of understanding, tolerance and solidarity	

Source: MoE, 2015

Box 3.1 Montenegro’s young people are underperforming in mathematics, science and reading

The OECD Programme for International Student Assessment (PISA) tests the performance of 15-year-old students in mathematics, science and reading – and this can serve as a measure of the quality and strength of educational systems. In 2012 and 2015, students were also tested in collaborative problem solving, in addition to reading, mathematics and science.

In the 2015 PISA tests, 15-year-olds in Montenegro scored 411 points in science compared to an average of 493 points in OECD countries. Girls and boys performed equally well. In mathematics, 15-year-olds scored 418 points compared to an average of 490 points in OECD countries. Girls performed better than boys. The average performance in reading of 15-year-olds was 427 points, compared to an average of 493 points in OECD countries.

With 62.3% performing low on collaborative problem solving, and just 0.2% of students testing as top performers, the mean scores in collaborative problem solving performance for both boys and girls in Montenegro stood among the lowest in PISA participating countries.

These results point to limitations in the quality of education in Montenegro – and a lack of focus on the development of problem-solving skills across all education levels in the country.

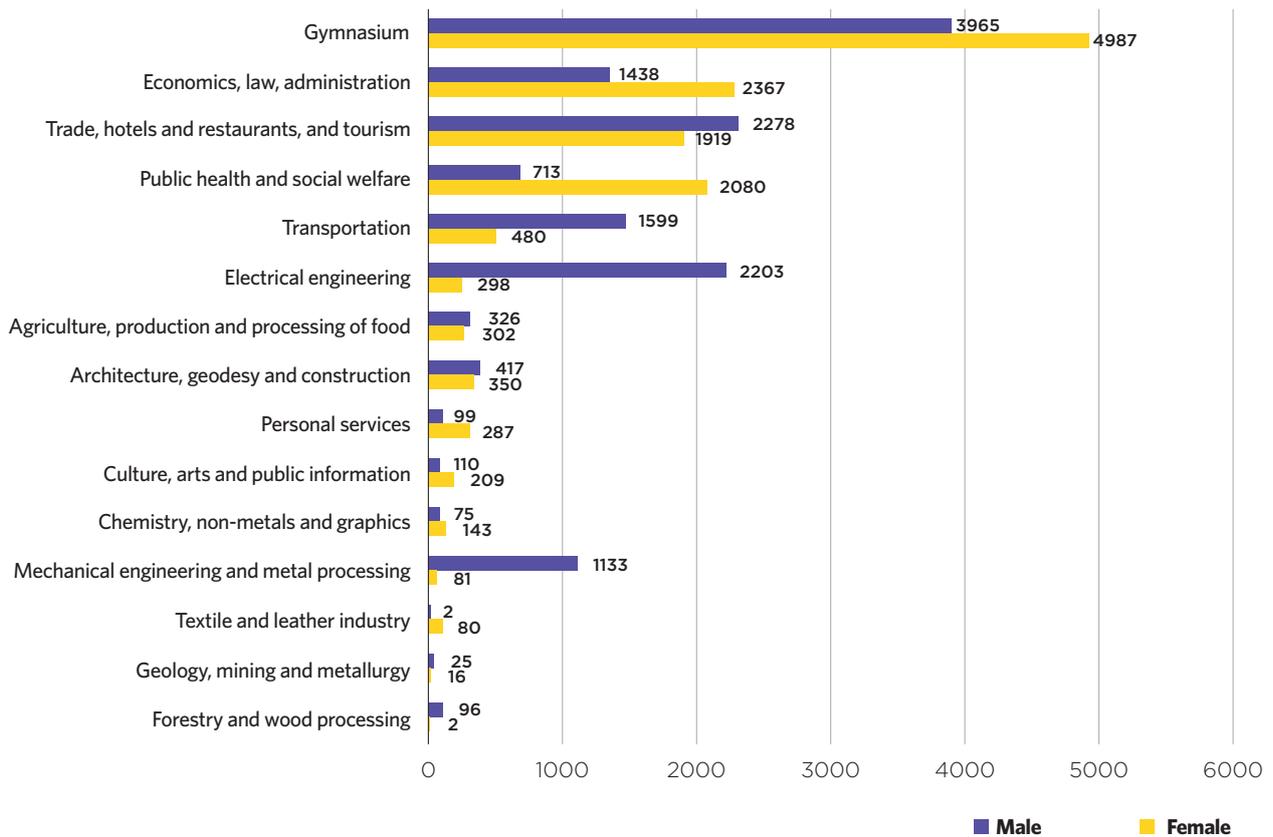
Source: OECD, 2019

Strengthening early childhood and primary education for digital skills remains a significant opportunity for human development in Montenegro’s digital society. But some of the larger digital rewards can be reaped through vocational- and tertiary-level reforms.

## Priority sectors in vocational education should shift towards digital opportunities

Vocational education in Montenegro plays a critical role in meeting the needs of the labour market and lifelong learning. Nearly one in three students – 31.3% – elects to study in a gymnasium (Figure 3.1), while 15.4% choose studies in vocational education in the fields of trade, hotels and catering, and tourism, while 13.3% study economics, law or administration. Those studying other fields make up 40%. Tourism stands out as a core economic area and public administration as one of the most popular sectors among employees in Montenegro.

Figure 3.1 Fields of study at gymnasiums and vocational schools



Source: MONSTAT, 2020d

But as established in Chapter 2, the automation expectation rate of accommodation and food service jobs is among the highest due to the emergence of automated hotels, the increasing use of robots in mowing grass, cleaning, food processing and so on. Similarly, as public administration entails many clerical tasks which can be automated and because of the further development of e-government in Montenegro, these work activities do not offer much in the way of future prospects for students. Reconsideration of the priority sectors that vocational education prepares students for is critical (Box 3.2).

Box 3.2 The priority jobs that vocational institutions train students for must be reconsidered

The Strategy for Vocational Education Development in Montenegro surfaces specific job roles prepared by vocational educational institutions with higher demand than current supply: specialists in electromechanics, machine designers and constructors, telecommunications experts, telecommunications switchgear operators, computer technologists, chemists, clothing and textiles manufacturers, and metallurgists.

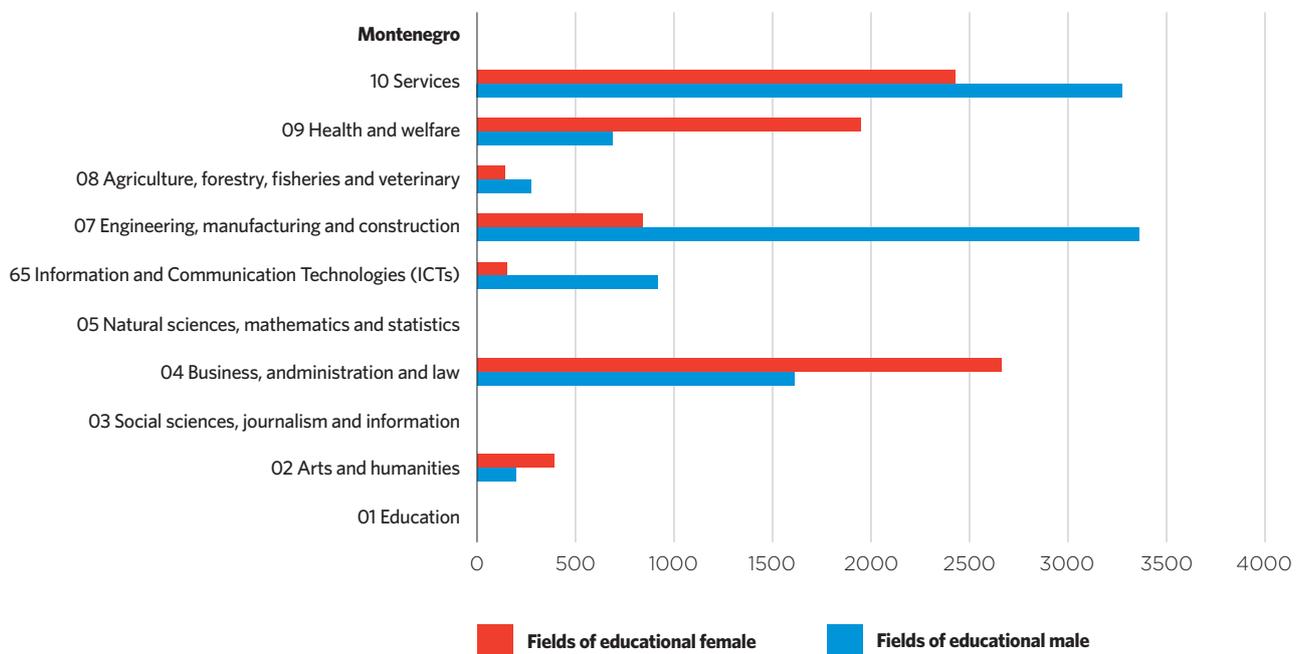
Taking a longer perspective to 2030 is necessary: the demand for mechanics and machinery repairers and electronics and telecommunications installers and repairers is expected to decline. And as workers in the mining and metals industry spend most of their time in physical and manual tasks, a reduction in their workforce due to automation is expected.

Given the emerging digital future of work, the range of job roles vocational institutions in Montenegro seek to prepare tomorrow's workforce for requires reconsideration.

Source: MoE, 2014; WEF, 2018

Popular areas for study among secondary school students include generic programmes and qualifications, business, administration and law, and engineering, manufacturing and construction – although strong gender-based differences in study preference exist. While vocational schools do not include specialization in ICT, interest in the development of digital skills stands relatively high (Figure 3.2). Yet female secondary school students appear uninterested in ICT – a trend that could benefit from shifting, given the emerging automation and ICT opportunities in Montenegro. Specialization in natural sciences, mathematics and statistics, social sciences and journalism, and in education remain unpopular among secondary school students.

Figure 3.2 Fields of study of secondary school students by specialization and gender



Source: MONSTAT, 2020e

Design and implementation of a targeted campaign to increase the popularity of information and communication technologies among female secondary school students would be beneficial. Similar campaigns have been successfully executed in several other countries from Australia<sup>32</sup> to Croatia<sup>33</sup>, Estonia<sup>34</sup> and the United States<sup>35</sup>.

## Higher education: mismatch between labour market needs and university supply

Overall, roughly 25,000 students are enrolled in Montenegro's institutions of higher education.\* In accordance with the Bologna Declaration, all higher education institutions follow a three-cycle system. The Bologna Declaration prescribes the 3+2+3 model used in the European Higher Education Area, offering the opportunity to complete the cycle of studies and greater mobility.

As a country in transition, Montenegro has only recently fully implemented the Bologna model because of the "specialization" studies between the Bachelor's and Master's degrees, which lasted for one year. The postgraduate specialist studies leading to a specialist degree represented a legacy from the former Yugoslavia, where undergraduate studies took a minimum of four years. However, according to the recently adopted Law on Higher Education, the model of study at the universities of Montenegro is now exclusively 3+2+3, which is required for re-accreditation of the Montenegro's universities.

Postgraduate studies in this manner represent an exception for countries in the European Higher Education Area. The introduction of postgraduate specialist studies, a studying model unknown to European practice, was caused by an insufficient coverage of the education reform in Montenegro. This situation cannot be sustained for two reasons.

- Firstly, the existence of such a study model different from those in other countries reduces the possibility of student and staff mobility.
- Secondly, with postgraduate specialist studies, enrolment in Master's studies will likely remain low, as one-year Master's studies are too short to be effective in terms of quality, consequently leading to lower enrolment in doctoral studies.

In effect, this system of education essentially stops with four-year Bachelor's studies – which is unsustainable.<sup>7</sup>

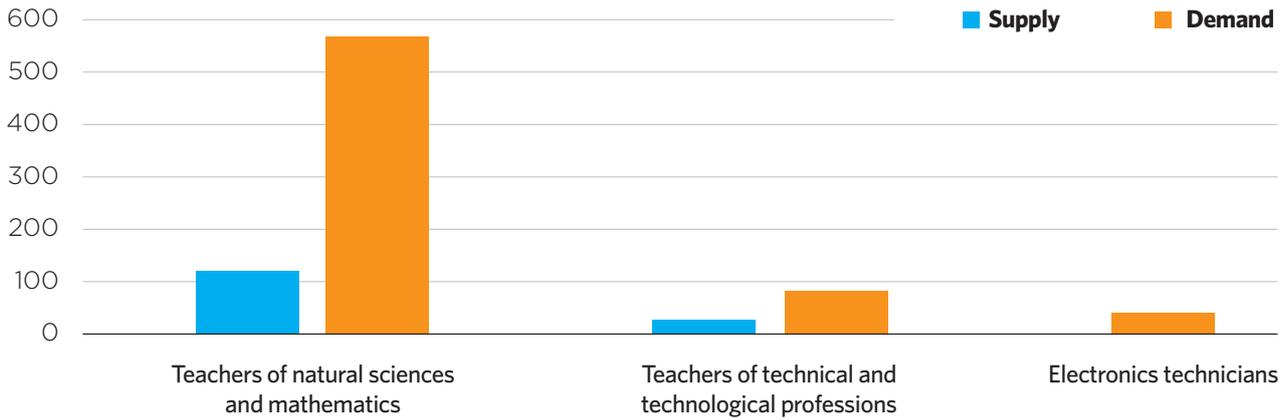
Additionally, qualifications acquired through the current system completion are preferred by employers who believe that the completion of three-year studies provides insufficient knowledge for the performance of a certain job. An external evaluation of this system found that private-sector employers may recruit students with a three-year study diploma provided they have also acquired practical and "soft" managerial skills during their studies. Public-sector employers, however, have proved to be more reserved. Renewed dialogue between employers and institutions is needed to better harmonize the content of higher education programmes and labour market needs.<sup>8</sup>

In general, staff at Montenegro's higher education institutions primarily engage in teaching. This leads to frequent complaints of diminished teaching quality as teachers take on heavy class loads.<sup>9</sup> Moreover, many institutions rely on visiting staff from abroad, mostly from Serbia. Reliance on guest lecturers limits the quality of teaching with scheduling and timing challenges.<sup>10</sup> The introduction and expansion of e-learning and digital tools in Montenegro's public universities can address these shared problems to strengthen the quality of education.

\* These are: the University of Montenegro (UoM), Mediterranean University, University of Donja Gorica (UDG) and Adriatic University (Univerzitet Adriatik), and three independent private faculties – the Faculty of Business Management Bar, Faculty for Administrative and European Studies, Faculty for International Management in Tourism (HEC) and one independent public faculty – the Faculty for Montenegrin Language and Literature.

Worker supply is higher than demand across nearly all professions that require higher education. In 2019, the overall supply in the Montenegro’s higher education was 2.9 times higher than demand.<sup>11</sup> By contrast, demand outstrips supply only in a handful of occupations – in mining, electromechanical technicians, electronics technicians, land surveyors, teachers of natural sciences, veterinarians and pharmacists.<sup>11</sup> In 2019, demand was higher than supply in several occupational groups. The biggest deficit was recorded with teachers of natural sciences and mathematics, with the ratio of supply and demand at 123:566, followed by teachers of technical and technological professions, and electronics technicians (Figure 3.3).

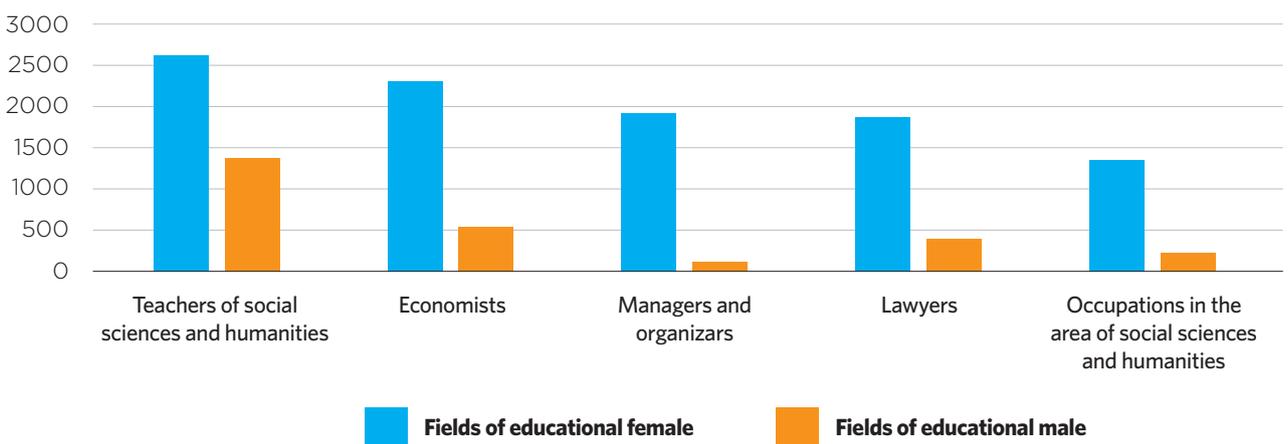
Figure 3.3 Gap between supply and demand across occupation groups in 2019



Source: Based on EAM, 2020

In 2019, the gap between supply and demand was the largest in the following occupation groups: teachers of social sciences and humanities, where the ratio was 2,607:1,361 (Figure 3.4). Economists, managers and organizers, lawyers and occupations in social sciences and humanities followed suit. These occupation groups account for over 50% of the total nominal supply and demand – and offer the largest number of new entrants from the education system to the Employment Office register.<sup>12</sup>

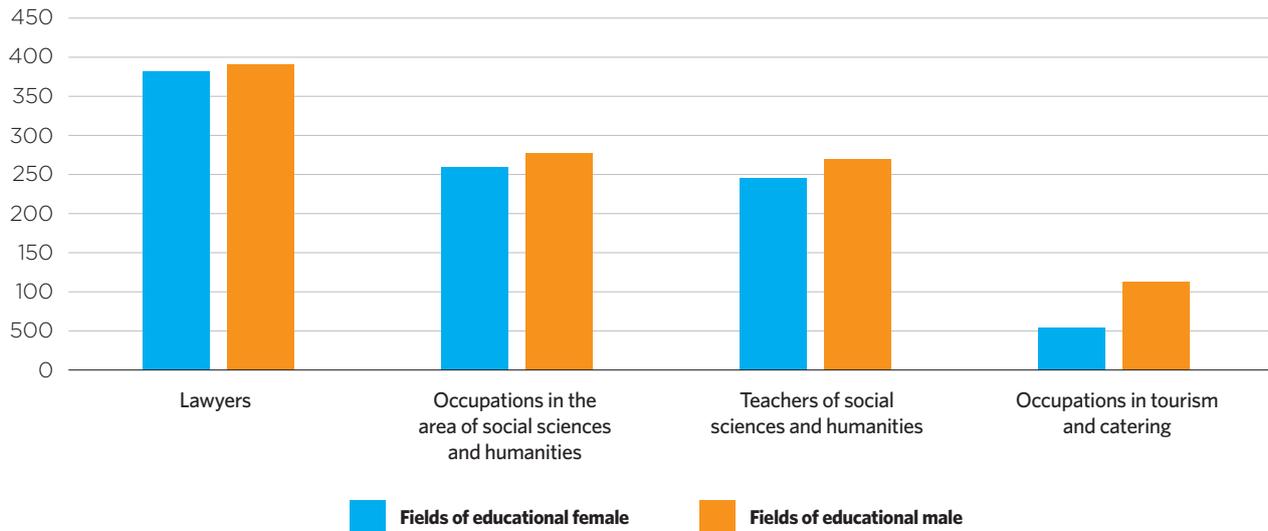
Figure 3.4 Oversupply with occupation groups in 2019



Source: Based on EAM, 2020

The largest increase in university graduates registered by the Employment Office as being unemployed between 2014 and 2019, the most recent period with data, was in the occupation group of tourism and catering, from 52 to 112 (Figure 3.5). This increase may be interpreted as one of the early indicators of automation in the tourist industry.

Figure 3.5 Increase in the university graduates registered as the unemployed by occupation groups



Source: Based on EAM, 2020

These patterns reflect a significant gap between the needs of the labour market and supply by Montenegro’s universities. Moreover, the high unemployment rate of university graduates is also likely a consequence of a perceived lack of the skills students should acquire during their higher education. The undertaking of analysis on the economic and social demands in Montenegro, the existing higher education trends and the development of new technologies and new professions is needed in order to craft a new enrolment policy for Montenegro’s institutions of higher education.

Additionally, as the curricula of Montenegro’s higher education institutions clearly do not correspond to the needs of the labour market, the sector-level commissions do not seem fit for purpose. A redesign of the curricula of higher education so that they align with the real and prospective needs of Montenegro’s emerging digital economy stands out as an urgent need.

## Research and innovation: platforms for digital transformation

Various digital tools can be used for e-learning, such as Moodle, IVA, Big Blue Button and Zoom. However, as the recent COVID-19 crisis has revealed, more targeted platforms are required by schools and universities. In response to the COVID-19 outbreak, the Montenegro company Amplitudo partnered up with the Montenegro Ministry of Education to develop a free-of-charge online platform, #UčiDoma (#LearnAtHome), to help teachers and students keep up with the school schedule.

Immediately after the Montenegrin government introduced provisional measures to prevent the spread of the virus, Amplitudo created a platform consisting of a website, a YouTube channel and an app, and made the platform available to the Ministry of Education, as well as to all the other state institutions that would help digitalization in order to overcome the new situation. This project enabled teachers, students and their parents to keep up with the schedule while staying safe at home. Completing the project was facilitated by support from the European Bank for Reconstruction and Development (EBRD) provided since the very early days of the company in 2006.

The outbreak of COVID-19 has also boosted collaboration between the science and healthcare sectors in Montenegro. At the Institute for Public Health (IPH) in Podgorica, doctors are conducting sensitive tests to detect the presence of coronavirus where it is suspected in patients.

When doing so, they are relying on highly specialized equipment, the real-time reverse transcription–polymerase chain reaction (RT-PCR) machine, which is the most reliable method of virus detection available. The institute acquired the machine back in 2015 to strengthen higher education and research at universities across Montenegro. The investment is now paying off just as the nation needs such highly sophisticated technology the most.

At present, the University of Montenegro is the only Montenegrin higher education institution with a strong capacity to undertake and publish research – and to attract competitive international funding from the European Union’s programmes, even if at modest levels.<sup>13</sup>

Strengthening research will require significant capacity building and funding. As resources earmarked for higher education are focused on teaching, a new strategy for funding could benefit from targeting research areas of high potential for excellence and those critical for advancing human development in Montenegro – such as conditions helpful for an inclusive digital transformation. Key to this is the need to build and maintain research infrastructure from laboratories to libraries, as well as providing access to international journals.<sup>14</sup>

Building research and innovation capacity can centre on a range of opportunities.

- **Facilitating postgraduate studies.** The development of doctoral-level education is tantamount to building research capacities in the Montenegro’s system. In many current curricula, Master’s students rarely participate in research activities. Montenegro’s PhD holders are professional researchers who need to complete their training under adequate research conditions. Strengthening research skills in postgraduate studies requires a long-term strategy with doctoral-level education as a key element.<sup>15</sup>
- **Expanding and scaling innovation funding.** The Ministry of Science issues two types of calls for projects: research projects and innovation projects. Fintech, blockchain, internet technologies and web development design dominate the current calls. The first call for proposals issued in 2017 identified five winning projects that received €20,000 each. In 2018, €1 million was allocated to seven projects. In 2019 MoS granted funds of €3.5 million for PhD scholarships, innovative projects, two new centres of excellence and strategic partnerships in the implementation of a pre-acceleration programme of innovative start-ups. Expanding and scaling innovation-centred funding to digital technologies can further the collaboration between academia and industry, increasing co-participation in research design, development and sharing. This will be implemented by the new institution – the Innovation Fund of Montenegro – to be established by the end of 2020, according to the recently adopted Law on Innovation Activity.
- **Leveraging technology parks.** The Ministry of Science established a science and technology park – a business entity jointly owned by the government and the University of Montenegro – under construction in 2020. The central unit of the science and technology park is in Podgorica. The other centre is located with Tehnopolis, in Nikšić, and is fully functional. Currently six to seven EU projects are running as its network of partners and staff recruitment continue to grow. The park is expected to involve all the other private universities of Montenegro and to serve as a model for academia–industry collaboration.

Our recommendation for research is to increase the funds allocated from the state budget of Montenegro to encourage research and development in ICT and applied digital technology. The rationale for this is that not preparing enough experts who will be needed in the era of rapidly increasing automation does not prevent automation from happening but it will prevent the people of Montenegro from benefitting from automation, because the needed experts will then be brought in from other countries.

## Cultivating advanced cognitive and socio-emotional skills across the education system

Computational thinking is a kind of analytical thinking essential for digital transformation. It shares with mathematical thinking methodical ways to solve problems, with engineering approaches to designing and evaluating large, complex systems, and with scientific thinking understanding and using computability, intelligence, the mind and human behaviour.<sup>16</sup>

Computational thinking can be viewed at the following three levels:

- **Digital literacy.** Digital literacy is the basic skill or ability to use a computer confidentially, safely and effectively, including the ability to use office software, such as word processors, email and presentation software, the ability to create and edit images, audio and video, and the ability to use a web browser and internet search engines.
- **Sector-specific skills in information technology.** Sector-specific skills in information technology are the skills of using computers in industry, commerce, the arts and elsewhere, including aspects of ICT systems architecture, human factors and project management.
- **Skills in computer science.** Skills in computer science involve systems analysis, data structures and algorithms, programming languages and data analysis.

These skills broadly map onto employers' expectations of their future labour force, where it is anticipated that most employees will need basic digital literacy skills in their work. This is already the case in most administrative jobs, but as other sectors become digitized and automated, the need for these skills is becoming increasingly prevalent. For example, in the travel and tourist industries, bookings are increasingly taking place online. Basic digital literacy skills should be developed by the formal school system at the levels of primary and secondary education.

Skills in computer science include skills in programming, but are much broader than these. Equipping young people with these skills spans across different levels of education – primary, secondary, vocational and tertiary. They start with teaching schoolchildren how to programme in coding and robotics clubs. Knowledge about data structures and algorithms and more advanced programming skills are offered at the levels of secondary and vocational education. Skills in systems analysis and professional software development, including software engineering methodologies, are provided at the level of tertiary education. Skills in data analysis, which enable one to use the right method for automated analysis of large quantities of (big) data and to make sense of the analysis results, are provided at the same level.

Building digital skills through the introduction of computer programming classes starting from primary school is a powerful tool to support the transition to new forms of quality education. But it remains insufficient in isolation. Coupling computational thinking with teaching advanced cognitive problem-solving and critical thinking in other subjects is needed. This change could cut across every significant layer in Montenegro's education system.

### From primary and secondary upgrades...

Innovative programmes are already under way. Recently, the British Council launched the "21st Century Schools" project to improve approaches in the application of technology in teaching and the development of critical thinking and problem solving. A central activity in this project is the preparation of the "Framework - Digital Competence," created as a product of cooperation between the Ministry of Education of Montenegro, the Bureau for Education, the Center for Vocational Education and the British Council. Through the 'Framework - Digital Competence',

the education system includes goals related to five areas of digital competence: information and digital literacy, communication and cooperation, digital content creation, security and problem solving. To reinforce the teaching of computational thinking at the level of primary education, “21<sup>st</sup> Century Schools” aims of bringing innovative teaching, problem solving and critical thinking to every primary school in the country – while equipping students aged 10–15 years with coding skills.<sup>17</sup> The full implementation of this Framework would provide a sound foundation for support the shift to a digital Montenegro.

Building on such a programme in secondary school can strengthen digital skills acquisition for the workforce of tomorrow in Montenegro. Accelerating adoption of e-learning, access to multimedia and interactive teaching materials, and the use of open educational content has the potential to strengthen teaching and organize open educational content for secondary education.

Additionally, delaying the choice of careers for students beyond secondary school can open up new avenues of opportunity. Currently, educational profiles set out a pathway for students to prepare for future careers in secondary school. By deferring the use of educational profiles, secondary education can refocus on a mission of imparting knowledge, skills, abilities and habits to students based on achievements in science, technology, culture and art in order to continue their education.

### ...to reskilling in vocational and adult education...

Increasingly, most job categories can benefit from strengthened problem-solving and socio-emotional skills. Indeed, employers identify a lack of these progressively essential skills as being at least as problematic as a lack of technical skills. A blend of general and technical skills is becoming highly valued and general and technical tracks of education and learning should be flexibly combined to consider the changing nature of work. Vocational education can serve to enhance students’ abilities to apply knowledge, experience and emotional intelligence to undertake tasks and solve problems.<sup>18</sup>

The demand for problem-solving and socio-emotional skills also applies to adult or continuous education. The Adult Education Plan for the period 2019–2022 emphasizes the need to strengthen the digital, social and other ‘soft’ skills of adults, from problem-solving to conflict resolution.<sup>19</sup>

Moreover, an important task of adult education is reskilling the labour force to match shifting demand for skills. CEOs around the world confirm a shift from seeking internationally experienced professionals to a focus on reskilling and upskilling their existing workforce.<sup>20</sup> The reason is that today’s jobs are being unbundled into tasks that could be offshored, automated, augmented with technology or re-bundled into new roles as organizations analyse how work gets done. Businesses also see nurturing of human skills, particularly leadership, creativity, empathy and curiosity, as essential if they are to benefit from the shift to new technologies.<sup>21</sup>

A good example from the neighbouring country of Serbia provides citizens with the opportunity to gain programming knowledge and skills for the position of junior programmer within the IT requalification programme funded by the Serbian government. The programme is open to the unemployed, as well as for those who are willing to change their existing jobs for better-paid jobs and for jobs with better prospects for career development.<sup>22</sup>

Based on the Survey of Adults Skills, under the OECD Programme for the International Assessment of Adult Competencies (PIAAC), adult performance reflects a range of factors: school system quality, level of economic development and historical levels of education.<sup>37</sup>

Although no assessments have been performed in Montenegro, in general the results of PIAAC tests in literacy, numeracy and problem solving are in line with studies of school-age children, according to the PISA tests. Gender differences in literacy and numeracy skills are typically small and more pronounced among older adults. Gender differences are not particularly pronounced in the domain of problem solving, although men have a slight advantage.<sup>23</sup>

### ...to realigning higher education to future work needs...

Analytical skills are particularly important for tertiary or higher education. The changing nature of work makes tertiary education more attractive in three ways.

- **Development of higher-order cognitive skills.** Technology and integration increase the demand for higher-order general cognitive skills, such as complex problem solving, critical thinking and advanced communication. These are skills that can be transferred across jobs but cannot be acquired through schooling alone. Rising demand for these skills has increased the wage premiums of tertiary-education graduates, while reducing the demand for less educated workers.
- **Cultivation of lifelong learning.** Tertiary education increases the demand for lifelong learning. Increasingly, workers are expected to have multiple careers, not just multiple jobs over their lifetime. With a wide array of course offerings and flexible delivery models, tertiary education is well-positioned to meet this growing demand.
- **Platforms for innovation.** Tertiary education – especially at universities – becomes more attractive in the changing world of work by serving as a platform for innovation.<sup>24</sup>

The development of higher education in Montenegro should enable students to gain competences for future occupations by encouraging creative and innovative work and personal development. Currently, university enrolment policy serves as a tool to determine the quality of students. A shift towards facilitating enrolment based on Montenegro's economic, social and environmental needs can harmonize tertiary education with new technologies and professions.<sup>25</sup> A joint, inclusive dialogue led by the Ministry of Education for employers and institutions of higher education to discuss the job roles and concrete technical, cognitive and socio-emotional skills needed has potential to fill this gap.

### ...and exploiting sites of informal learning

The focus so far has been on formal institutions of learning. Yet informal education remains a powerful setting for the acquisition of technical, cognitive and socio-emotional skills. Informal gatherings, hubs and hackathons can serve as especially useful platforms for exchange, networking, student learning and future recruitment.<sup>26</sup> Interactions of this type represent a touchpoint between education, professionals and current events and trends.

## Education as a driver for the digital economy and society

Multiple lessons learned about how education policy can encourage the development of digital skills, from within the region and around the world, provide an insight into the pioneering tools and solutions that Montenegro can apply not only to limit the risks to workers and the economy of the digital revolution, but also to make the country a global leader (Box 3.3). The introduction of a dual education model into the vocational secondary education system has already been implemented in Montenegro.

### Box 3.3 Regional lessons on how education can support digital transformation

In late December 2016, the Government of Serbia adopted an action plan for improvement of the IT sector. The proposal envisages a series of measures to support retraining in the IT sector, the development of formal education in this field, as well as for creating a positive enabling environment for IT companies, start-ups and SMEs. The overall goal of the programme is the enhancement of the employment of students in IT.

In November 2017, the National Assembly of the Republic of Serbia adopted the Law on Dual Education, introducing a dual education model into the vocational secondary education system. The objectives of dual education are: to provide the conditions for acquiring, improving and developing competencies in line with labour market needs, contributing to strengthening the competitiveness of the Serbian economy and enabling employment after the completion of education. For example, the following new job profiles have been introduced according to the dual education model: Technician for Digital Graphics and Internet Shaping, Information Technology Electro-Technician, and Technician for Safety of Information and Communications Systems in Air Traffic.

Source: EC, 2019

Development of digital skills in Montenegro can follow a pipeline where a flexible solution for developing digital skills is first offered through informal education, especially using industry expertise and, increasingly, through the formal education system at the levels of primary, secondary, vocational and higher education.

Across all levels, digital competencies should be acquired by all students to prepare for the demands of the future labour market and to perform better in a contemporary society. Indeed, a forward-looking agenda can make Montenegro a leader in the integration of computational and advanced cognitive thinking into school curricula (Box 3.4)

### Box 3.4 Making Montenegro a leader in the integration of computational thinking into school curricula

Global experience provides a basis for lessons learned on how to infuse computational thinking and advanced cognitive analytical skills into school curricula.

- **Mandatory coursework in Serbia.** In the Republic of Serbia, computer information systems have been introduced as a mandatory course for all students, starting from the fifth grade of primary school. For students of secondary schools (gymnasiums), the number of specialized IT classes has been increased. For secondary school students in vocational schools, following a request from the industry and parents, the following new job profiles have been introduced according to the dual education model: Technician for Digital Graphics and Internet Shaping, Information Technology Electro-Technician, and Technician for Safety of Information and Communications Systems in Air Traffic. In addition, citizens can gain programming knowledge and skills for the position of junior programmer within the IT requalification programme funded by the Serbian government. The programme is open to the unemployed, as well as for those who are willing to change their existing jobs for better-paid jobs and for jobs with better prospects for career development.

- **Supporting teacher programming and robotics initiative in Estonia.** In this country, teachers are encouraged to initiate courses on programming and robotics to preschool, primary and secondary school students. Schools provide study materials and networking opportunities available on the home page of the so-called “Proge Tiiger” programme. So far, the programme has been implemented only in several pilot schools, programming hobby groups for high schools and selective courses for secondary schools. Study materials for all levels have been created. As of June 2019, 698 preschools, elementary schools and secondary schools have been mentioned as cooperation partners of the “Proge Tiiger” initiative.
- **Introducing digital technology subjects in Australia.** The Australian National Curriculum includes a Digital Technologies subject for K-10 students in which they “use computational thinking and information systems to define, design and implement digital solutions”.
- **Technical and financial support to upskill workers in Luxembourg.** Luxembourg Digital Skills Bridge provides technical and financial assistance to upskill employees in companies facing disruption and is a good example of a highly targeted approach. The programme aims to develop a common national strategy and support mechanism to aid in the future skills development of the national workforce and assist companies in their response to the digital transformation of their businesses.

## Higher education

The role of tertiary education systems as centres of innovation is highly valued as well.

- There are well-known examples of successful university innovation clusters in the developed world – in the United States at Stanford University, the Universities of California, Berkeley (Silicon Valley) and Harvard – Massachusetts Institute of Technology (Boston’s Route 128)
- In the United Kingdom at the University of Cambridge–University of Oxford–University College London (the “golden triangle”).

Clusters are also emerging in middle-income countries.

- The University of Malaya in Malaysia has established eight interdisciplinary research clusters over the last decade covering sustainability science and biotechnology.
- Peking University is building Clinical Medicine Plus X, a research cluster for precision medicine, health big data and intelligent medicine.
- As part of the Startup India initiative, seven new research parks have been established on campuses of the Indian Institute of Technology to promote innovation through incubation and collaboration between universities and private-sector companies.
- In Mexico, the Research and Technology Innovation Park currently houses more than 30 research centres covering research and development in biotechnology, nanotechnology and robotics. Seven of the centres are run by universities.

Source: CIEIT, 2019; Proge Tiiger, 2019; Wing, 2017; GoL, 2019; WB, 2019a

## Chapter 4

### Making e-governance work for all

Digital transformation will impact Montenegro's human development in multiple pathways – if not managed inclusively, uncontrolled transformation will generate new winners and losers and entrench the existing inequalities based on geography, income and wealth, age and gender. Innovative interventions to support those who will be displaced or on the wrong side of the digital divide must emerge. Whether digitalization harms or accelerates human development will not be defined in a policy vacuum, but rather shaped by the choices we make in designing governance for the future.

An adaptive, digital and effective governance structure is necessary to place human development at the centre of digital transformation. This chapter asks: what policy and institutional arrangements will promote inclusive digitalization in Montenegro – and how can digital transformation generate e-governance arrangements that serve all the people of Montenegro in the future to come?

In this chapter we focus on the governance aspects of the digital transformation of Montenegro in favour of the human development and information society. Multiple dynamics come into focus, from taxation and data regulation to voice, connectivity and citizen power facilitated by technology, and the best practices on how to build an inclusive digital state. The key challenges of data privacy (the new 'oil'), human bias replicated in technology and questions of how to tax robots, digital businesses and activities will be assessed. Debates on institutional effectiveness, policy gaps and cross-country lessons learned will form the backbone of this chapter.

Digital technology can bring governance increasingly into the hands of the people, but risks exist. Moreover, digital sector growth that places human development at its centre requires a conducive enabling environment, policy framework and strategies.

Over time and around the world, various attempts at e-governance have been implemented, but they invariably fall short of expectations. A common challenge plagues these efforts: the system designed is proving to be insufficiently comprehensive.<sup>1</sup> What can Montenegro do to change the course of this history? Drawing on some of the best practices is one starting point (Box 4.1).

Box 4.1 Global, regional and national best practices for e-governance

While efforts to deploy fully functioning and effective e-governance systems that place human development at their centre continue to evolve, a suite of global, regional and national experiences are providing support for and an insight into Montenegro's adoption.

#### **The global Digital 9 network**

The Digital 9 or D9 is a network of the world's most advanced digital nations with a shared goal of harnessing digital technology and new ways of working to improve citizens' lives. The D9 countries have a track record in leading digital government, including designing services around the needs of citizens and businesses and sharing open-source solutions with other countries.

As a group, the D9:

- Shares world-class digital practices
- Identifies improvements to digital services
- Collaborates to solve common problems
- Supports and champions the group's growing digital economies

The founding members of the network include: Estonia, Israel, New Zealand, South Korea and the United Kingdom. Canada and Uruguay joined the group in February of 2018, and Mexico and Portugal joined in November 2018.

### **European Commission's digital economy and society index**

At the regional level, the European Commission is managing the digital economy and society index (DESI) under the Digital Single Market. The DESI is a composite index that summarizes relevant indicators on Europe's digital performance and tracks the evolution of EU member states in digital competitiveness.

According to the 2018 DESI, Denmark, Sweden, Finland, and the Netherlands have the most advanced digital economies in the EU, followed by Luxembourg, Ireland, the UK, Belgium and Estonia.

### **Learning from Estonian experience**

From an e-government perspective, Estonia is the most developed country, where 96% of internet users who need to submit forms to the public administration choose to do so through governmental portals. According to the 2018 DESI, Estonia stands at the cutting edge of the online provision of public services – representing its best performing dimension on the index.

The share of e-government users in Estonia (96%) is the highest in Europe – twice the EU average – and the country is among the top five countries in using pre-filled forms, online service completion and the range of digital services available for businesses.

Estonia's success in making public services available online is mainly based on the widespread usage of electronic identification cards and the creation of a digital information infrastructure – X-Road – through which a secure internet data exchange layer allows decentralized databases and information systems to communicate with each other.

Through X-Road, parties share information needed to provide services that people can access with their electronic identifications. Since 2015, Estonia and Finland have been developing a joint data exchange platform based on Estonia's X-Road. It allows databases in both countries to exchange information, which makes many cross-border e-services available to both Estonian and Finnish citizens.

As Montenegro continues development of its own X-Road to expand e-service penetration, which has been delayed due to the COVID-19 outbreak, the country can draw lessons from Estonia's experience to maximize data exchange and user-centric design. This is the most relevant as just 5% of Montenegro's people report performing public administration-related e-services.<sup>32</sup>

## Montenegro's e-services landscape

A technological maturity model used in Montenegro provides a basic framework to assess the state of the e-services landscape. If applied to public services, the extent of the accessibility of e-services can be defined. Roughly, the stages of maturity range sequentially are:

- **Level 1 Information** exists electronically about the service.
- **Level 2 One-way communication:** Forms can be downloaded from the internet, to be filled in manually.
- **Level 3 Two-way communication:** Forms can be filled in and submitted online and the public service will be triggered for the authorized user.
- **Level 4 Transaction:** Services can be provided fully on-line by electronically submitting filled-in forms or data for processing. The output is also delivered electronically.
- **Level 5 Personalized service:** The entire service can be performed on-line, automatically and proactively.

In Montenegro, services provided at all five different technology maturity levels are called e-services. On the eUprava.me portal, out of the 593 e-services in total, 227 fall into L1, 181 into L2, and 185 into L3. The only L4 service available is for the online enrolment of children in schools and kindergartens. Since there is no service at the fifth level at all, this section points to the lack of both L4 and L5 services in the Montenegro's current e-government ecosystem.<sup>2</sup>

For example, under the Ministry of Labour, 14 different internal institutional web services have been combined and made interoperable so that citizens can go to one place to apply for them, but these services cannot be considered e-services. On the other hand, the situation is also rapidly evolving. As of May 2020, the Ministry of Education put into implementation an e-service for the online enrolment of children in kindergartens and elementary schools which corresponds to the L4 service, as mentioned above.

That said, some critical steps have been taken in the right direction. The Government Service Bus Single Information System for Electronic Data Exchange (SISEDE) platform, also referred to as the *Jedinstveni informacioni sistem elektronske razmjene podataka* (JISERP), was established in 2018. Its primary goal is to ensure communication between existing systems and faster exchange of information between citizens and officials, enabling the provision of services electronically and the automated exchange and use of large amounts of data stored in state registers. The basic function of a central, interoperable system is to provide the institutions with a single communication platform for safe and reliable data exchange and thus provide the basis for the quality and fast delivery of services.

Electronic services for citizens and businesses are based on business process reengineering and implementation of interoperability, minimizing the time and costs for citizens and businesses needed in the exercising of the rights and duties towards the administration. Best practices from the application of electronic services, based on the modernization of public registries and application of interoperability, enhance the efficiency of the state authorities and state administration bodies, thus helping the economic development of the country.

To date, only some attention has been paid to the citizens' perspective of services, given that the higher levels of e-service maturity require the introduction and use of electronic identification. The Ministry of Public Administration has yet to build new systems incorporating the new eID documents that every citizen in Montenegro will soon have. Furthermore, awareness of the eID's opportunities and advantages needs to be raised more broadly across the country. Additional legal and policy work is required before such e-services can be offered.

## Policy framework for e-governance

In 2017, a new Law on General Administrative Procedure (LGAP) entered into force in Montenegro. The explanatory note to the law emphasizes that public administration must be adjusted to changes in society, including the use of ICTs, to “fulfil the role of a socially useful and necessary service in the function of social progress”. While the LGAP provides a clear policy framework, harmonization and obstacles remain.

The harmonization of sector-level laws with the LGAP continues to evolve. Administrative procedures and data sharing requirements, time limits and fees for procedures remain matters that are still under determination. The Law on Free Access to Information contains rules on how access to information should be proactive. An open data format is prescribed with requirements on what data needs to be electronically published. The provisions of Directive 2003/98/EC on the re-use of public information are covered by this law.

An obstacle mentioned by several interlocutors from both ministries and the NGO sector is that for certain areas, such as health, tax administration and social services, special requirements for sector-specific legislation on the services offered exist, which fail to suit how services could be offered in the common e-government portal. For an efficient kick-start to the e-government portal, we recommend first providing through the e-government portal commonalities that are independent of the specific service, such as shared payment services, an identification service and so on.

Reluctance regarding data exchange is also related to organizational aspects, such as the clear delineation of responsibilities within the whole e-service value chain. Service level agreements (SLAs) have not yet been formulated, which is causing everyday problems between the state institutions. As these agreements determine who can access data, what constraints exist and how the data is to be protected, they are very important from the viewpoint of secure data exchange. At the same time, the existence of such agreements is important to promote data sharing and place the data in a specific and clear context. In the absence of service level agreements, when an incident happens during the e-service delivery, the parties may not know who is responsible for resolving the issue.

Also, the helpdesk that has been outsourced works on a daily office schedule of 8 am to 5 pm, rather than being available 24/7. Since the owners of the public service take full responsibility, uncertainty and lack of control in e-service provision is a key obstacle to strengthening interoperability through the Single Information System for Electronic Data Exchange (SISEDE). As such, establishing SLAs between service owners and the data exchange system owners with clear responsibilities and service requirements is essential, along with adequate funding to support the fulfilment of those requirements.

As the LGAP has introduced the official responsibility to exchange information, a legal obligation now exists. However, the usage of a specific platform for information exchange or sharing by electronic means is not required by this law. The infrastructure for electronic information exchange is not yet in place, although work on this is under way. Data sharing in practice still often takes place in a traditional manner – on paper or CD – which involves the risk of the data being compromised or data going missing.

More detailed rules on the interoperability system are found in the Decree on the Content and Management of Data in a Single Information System for Electronic Data Exchange (2 July 2015). This contains detailed and mainly rather technical rules and does not oblige one to use the system but sets the parameters that would allow to use it. To enable the functioning of the interoperability system, there is the Rulebook on Records of Electronic Registers and

Information Systems of State Authorities and Public Administration Bodies (15 May 2015).

In order to mitigate the risk of data misuse, we recommend making usage of the SISEDE mandatory for information exchange. Strong monitoring of data usage is an important measure for building trust in society.

## Accelerating a citizen-centred system across all governance arrangements

On-going efforts to make the public administration increasingly efficient and citizen-oriented focus on policy improvements, infrastructure improvements, enhancing digital access and the overall transparency of the system. To implement these mechanisms, raising awareness of communities about the overall importance of digital services and tools is critical. This includes their greater efficiency and benefits, such as reducing the time and administrative procedures, cutting red tape, ease of monitoring the process of meeting requirements and offering direct communication with public administration.

With the onset of the COVID-19 pandemic, public services have experienced severe delays, due to the continued use of traditional and paper-based processes. Digital tools have proved essential in the provision of a unique, powerful entry point. Accelerating the promotion of the effective use of digital services and tools should be a key priority to significantly strengthen resilience.

The key to making digital transformation the effective response to COVID-19 is establishing trust in a digital future for Montenegro, especially in e-commerce and e-services, since the pandemic has showcased the value of ICT and digital transformation and how governments should accelerate the transition.

To make the greatest impact, a comprehensive e-government programme should include four attributes:

- **End-user-driven modernization:** offering individuals and businesses consistent and efficient interactions with public services – designed to improve the customers' experience and ensure quality in end-to-end services.
- **All-of-government approach:** An approach that targets the entire portfolio of government services in a comprehensive way, rather than taking only specific services in isolation.
- **A cross-government design** that cuts across agency and organizational boundaries.
- **An efficiency-driven programme** using state-of-the-art technology.<sup>3</sup>

Establishment of strengthened public administration represents one of the key challenges of the European integration process in Montenegro as it requires extensive reforms to advance state capabilities to provide quality public services. Development of a renewed concept of public service can not only meet the demands of the EU integration process and provision of electronic services – but also place the people of Montenegro at the centre of comprehensive service provision (Box 4.2).

## Box 4.2 Putting citizens at the centre of service provision

While some legislative provisions can be interpreted to support the idea of public service, no explicit legal provision exists to define and guide public services in Montenegro. A citizen-centric approach is missing. In its absence, ministries and authorities can fall into a pattern of designing, implementing and monitoring service provision via the internal lens of the institution – rather than putting citizens’ participation, demands and needs at their core. Putting the users’ experience at the centre of public service provision in Montenegro can strengthen the human development outcomes of digital transformation.

As part of the EU accession process, Montenegro has developed and adopted the Public Administration Reform Strategy 2016–2020 (PAR Strategy). The PAR Strategy encompasses the entire public administration system, including state administration and local self-governments and organizations with public powers. Since successful public administration reform represents a substantial precondition for functional public services and economic growth, meaningful implementation of the PAR Strategy, its objective evaluation and the design of the next phase of a people-centred public administration strategy remain critical.

### Expanding e-services via the e-government portal

The PAR Strategy vests e-services with an important role: the range of electronic services provided via the e-government portal should be both increased and the capacity to offer these services optimized for efficiency. It also recognizes a service-oriented approach by stating that: “Every democratic society needs a public administration which is a guardian of the public interest on one side, and oriented towards citizens, entrepreneurs and broader social community as a service-oriented activity on the other.”

The strategy sets the interoperability of registries and accessibility of registry data for users as a strategic goal. Interoperability includes measures related to the functionality of electronic records and information systems through a system for electronic data exchange. An important condition for data exchange between registries is a unified system for electronic data exchange between public institutions and administrative bodies.

Such a system is envisaged by the Law on Electronic Administration and was aimed to be in place by mid-2016 but was delayed. The law started to be in use in 2020 and it recognizes the possibility of submitting communications to the government in electronic format and makes an e-government portal universally available. These constitute important elements of a citizen-centric government.

However, as special requirements in other legislative acts hinder the usage of electronic format, electronic communications remain incomplete. Legislative change management can be leveraged as a tool to remove barriers to electronic communication in a continuous change management process.

A set of barriers need to be overcome for the successful development of the e-government portal.

- **Application of the Risk Data Protection Law is hindering e-government.** Montenegro has a data protection law which is largely in compliance with the EU rules – GDPR and e-privacy regulations. Data protection provisions have existed for some time but used to be spread out in different sector-specific laws (as a legacy of the Yugoslav-era law-making style). The current law includes provisions on an independent data protection authority, which is in line with the EU rules and forms a key component of secure digital data flows.

However, the risk remains that the interpretation and subsequent application of privacy protection provisions is being used to prevent the sharing of any data and is proving an obstacle to the development of e-governance. To mitigate this, involving the data protection authority – the Agency for Personal Data Protection and Free Access to Information (AZLP) – in the development and implementation of e-services and e-governance is critical. This would give the data protection authority a role in consulting and advising stakeholders in the proper interpretation and use of the GDPR’s “privacy by default” and “privacy by design” principles.

The AZLP has enforcement powers for data protection breaches and monitors how data is processed and data protection rules are implemented. The law specifies the duties of data controllers – the individuals or legal entities which process personal data. The AZLP has a range of sanctions at its disposal, aimed at correcting breaches and ensuring the data handling is done properly. Misdemeanour proceedings may be started under the data protection law, with specified levels of fines. For serious breaches, the Criminal Code contains the offences of unauthorized acquisition or disclosure of personal data and similar breaches. The data protection legislation is under review to bring it completely into line with the EU’s General Data Protection Regulation, but the key principles will not change.

- **Lack of clarity on laws.** According to NGO-sector stakeholders, some authorities are resisting using e-government because the law on which their work is based is not clear enough, generating doubt about whether a legal basis exists. The understanding that e-services are new ways of doing things – not ways of doing new and different things – is still not widespread.<sup>4</sup>
- **Comprehensive catalogue of public services is missing.** There is no comprehensive catalogue of public services in Montenegro, so the second aspect of the e-government is not met. Basic overviews are being made for specific services or in specific contexts, for example, for local authorities. A basic list has been prepared by the Union of Municipalities to include the tasks performed by authorities. However, tasks are described according to what is needed to achieve the laws, rather than based on a comprehensive and common understanding of public service from a citizen-centred perspective.

## Towards a comprehensive public service portfolio management system

Implementation of a comprehensive Public Service Portfolio Management (PSPM) system can pave the way to overcoming the multiple challenges.<sup>5</sup> Portfolio management of services is a methodologically standardized approach for describing services and is a precondition for service development. If the authorities that are responsible for the services – the service owners – describe the information about public service provision in a uniform way and in the agreed language, it can lead to various benefits over time.

The PSPM represents a toolset for e-governance strategy planning and yields a proven set of benefits. The impact of services can be assessed; overlapping services can be reduced; service development is better coordinated and organized, as several authorities benefit from a single effort; and service development via portfolio management supports their more cost-effective and transparent functioning. A range of benefits emerge, as follows:

- **Multichannel approach.** One of the benefits of the PSPM is a multichannel approach. It enables effective decision-making on how public services should be delivered and through which channels, accounting for the context of the target group. Through this

approach, the precise channels for specific e-government services should be tailored to the needs of individuals, based on demographical and other factors, and the business community. Potential channels include online, telephone (landline and mobile), fax, e-mail, regular mail and interactive TV, as well as onsite service desks and kiosks.<sup>6</sup>

- **Tailored planning.** The approach allows adequate e-governance strategy planning for every single authority. According to the service management maturity in an organization, a tailor-made recommendation can be made for the development of service management.
- **Impact measurement.** Public service performance and impact is significantly streamlined and assessed. The PSPM consists of multiple KPIs that can be used for measuring diverse aspects of the public administration reform and human development. Measuring instruments enable decisions to be made both during service creation – from needs assessment to measuring the wider impact on society. It also ensures the capability to determine the level of priority of service development.<sup>7</sup>

## Components of effective e-governance work

Political will and vision, clear lines of authority and responsibility, and a comprehensive policy framework are key dimensions to ensure e-governance works for all people in Montenegro.

### Establishing authority and responsibilities

In virtually all cases, successful e-government programmes depend on a strong support from the very top ranks of the government.<sup>8</sup> A range of factors prove useful:

- **Ensure clear senior leader sponsorship and strategic aims.** As of today, Montenegro has an opportunity to leapfrog some steps in the development of information society and e-governance. While having a relatively good legal environment, Montenegro is just about to start the real digital transformation journey. This opportunity benefits everyday people to a large extent – the information society environment can be built with a very strong focus on user-friendliness.
- **Breakdown silos.** Digitally mature countries suffer today from silo-based legacy systems that were historically built in isolation from other ministries or even other government agencies. This has resulted in non-interoperable and complex sets of technologies. The redesign of such systems so that they would support today's needs for e-governance and e-services across the silos is expensive and takes a lot of time.
- **Establish clear lines of responsibility and cross-collaboration.** As expressed by the 60+ Estonian top-level public-sector managers, directors and IT leaders during the Information Society Course event in 2019, authorizations and clear responsibilities are the most important aspects for collaboration across silos for better e-service development (Figure 4.1).

Defined governance authority and responsibilities to lead and coordinate e-governance is essential to successful execution – and to build social trust. Several countries provide a foundation for best practices to ensure this (Box 4.3).

Figure 4.1 Senior officials identify authorization and clear responsibility as critical for e-services



Source: Author. The blocks represent the percentages of more than 60 Estonian top-level public-sector managers, directors and IT leaders who agree on the importance of each factor for e-service development.

Box 4.3 Regional lessons point to the need for a comprehensive institution on e-governance

In December 2016, the Serbian Government formed the Ministerial Council for Innovative Entrepreneurship and Information Technologies to facilitate the Fourth Industrial Revolution in the country. The council governs the priority objectives and activities of all state administration bodies and government services for the improvement of the ICT sector in Serbia. The executive organization was established for central management of e-government: the Office for IT and e-Government.

In Estonia, the Ministry of Economic Affairs and Communications (MEAC) is responsible for state ICT and e-governance development. MEAC also assesses all of the ICT investments in all state administration bodies so that they would be aligned with the overall information society strategy.

In Montenegro, similarly to Estonia, the Ministry of Public Administration (MPA) is responsible for the development of e-governance. The MPA, however, lacks the authority to influence ICT investments made by other ministries and agencies. This raises the risk of building a silo-based e-governance system in Montenegro.

Vesting the MPA with the authority to assess and determine the value for money of ICT investments across all state administration bodies can support a comprehensive, inclusive cooperation framework across ministerial and agency boundaries.

## Maximizing e-services for human development

Electronic tools can significantly support the engagement and voice of citizens, civil society and businesses. To provide conditions for this, an e-government portal was created in 2010 as a central point for a simple and user-friendly access to information and public administration services over the internet for citizens and businesses.

When digitalizing public services, certain key technologies in physical infrastructure should be in place along with their management processes, which should be utilized by each public service process. When it comes to optimizing public service processes, the means for cutting costs by reuse should be considered. Reusability is also a key attribute in the digitalization of public services. When digitalizing public services, there are always similar cross-cutting aspects, raising the following nine important questions that should be answered:

1. How to promote the public service and its description conveniently?
2. How to make the public service more accessible to service customers?
3. How to identify the customer of the service without physical contact?
4. How to get the a declaration of consent from the customer of the service without a physical signature?
5. How to quickly acquire the information needed for service delivery processes?
6. How to effortlessly use the required competencies in service delivery?
7. How to eliminate costly human errors from service delivery?
8. How to keep track of service delivery?
9. How to effectively communicate with the customer of the service throughout the whole service delivery process?

It would be costly and inefficient to answer these questions and solve the corresponding problems separately for each service.

Instead of that, this report recommends providing a common infrastructure, enabling reuse of once-provided components over and over in each service where they are needed. This introduces opportunities to centralize quality management of the supporting technologies and in this way provides standardized support for the entire service portfolio. The comprehensive Public Service Portfolio Management framework is a prerequisite for this approach.

## Chapter 5

### Realizing Montenegro's digital future

This report marks a starting point in the search for answers to multiple existential questions about the future of work and human development in Montenegro in an era of emerging automation, robotics, artificial intelligence and other technologies. At the edge of an emerging digital future, this chapter proposes an agenda for action that strengthens digital transformation for human development – and human development for inclusive digital transformation in Montenegro.

Digital transformation contains multiple positive human development impacts.

- Digital transformation has accelerated the global production of goods and services, particularly digital trade. A distinctive feature of the digital economy is the prospect of zero marginal cost, where digitalized knowledge in data and applications, once generated, can be reproduced endlessly at almost no extra cost.
- The digital economy affects whether work translates into jobs and employment in that some of the goods and services that people consume are produced by the consumers themselves – they have become “prosumers.”
- Many personal services have moved online. Online services require less commitment than employing service providers full-time and allow customers to use services occasionally. The online system can also provide temporary work opportunities for those who are seeking extra paid work or for people who want a flexible schedule.

Digital transformation also enhances creativity by providing platforms supporting the accumulation of small innovative ideas. In many cases, marginal adjustments of processes can have big cumulative effects on innovation in the workplace.

Moreover, vulnerable groups can be supported through digital transformation. The digital economy enables women to access work that lets them apply their creativity and potential. Many women have moved to e-trading as entrepreneurs or are employed through crowdworking or e-services. Even women entrepreneurs in low-income developing countries can now use mobile telephones to gain access to market information and sources of finance. They can also do so flexibly from home.

Yet women, for a multitude of economic, legal and cultural reasons, have faced significant barriers to access to technology. Compounded with the already dire situation of workplace inclusion and access to equal salaries, this digital transformation may exacerbate the gender gap. In effect, digital transformation holds considerable and divisive human development implications – both positive and negative. It has given rise to enormous opportunities for some but risks for others.

The main channels of impact will be mediated through jobs in Montenegro. Policies, funding and strategies are needed to ensure that digital transformation expands human development equally to reduce risks. Education and innovation provide a platform to ensure no-one is left behind. And the digital policy landscape requires interventions to accelerate inclusive transformation.

## Mapping digital futures: digital economy scenarios

What would a digital Montenegro look like? Scenarios provide insight into long-term plans and can serve to imagine future possibilities – equally, of action or inaction. To support analysis on the benefits and costs of digital transformation, this report sets out potential scenarios, ranging from “business as usual” to the full adoption of digital technology in Montenegro.

- **Business as usual:** In a “business as usual” scenario, no significant public-sector reforms take place in digital government or e-services. National digital identities will not be implemented in the near future. Information is kept in silos and data interoperability across public-sector institutions will not work as envisioned.
- **Realistic:** Only minor public-sector reforms will be directed towards digital government and e-services. National digital identities will be implemented but not widely used by citizens and enterprises because they have not been made compulsory and due to the lack of the relevant coordination among the market participants – including the public sector, banks and the ICT sector. The Single Information System for Electronic Data Exchange (SISEDE) enables basic data interoperability, and a small number of public-sector institutions will start sharing their data.
- **Optimistic:** In this scenario, significant public-sector reforms will be directed towards digital government and e-services. National digital identities will be implemented and made compulsory. The implementation of national digital identities will occur in close cooperation between the public sector, banks and the ICT sector. The SISEDE enables basic data interoperability and increasingly more public-sector institutions will start sharing their data.
- **Digital Montenegro:** Government implementation of electronic identity in collaboration with local banks and telecommunications companies takes place – enabling multiple private- and public-sector e-solutions. This facilitates the wide use of e-IDs, saving citizens, business owners and government officials time and money. Digital signatures are legally binding. Increasingly more government institutions and private-sector companies share their data over the SISEDE, in this way increasing the efficiency of both the public and private sectors.

It is possible to map out a sequence of impacts by a range of critical spaces of policy action for digital transformation to illustrate the outcomes in each scenario (Table 5.1). What priority agenda for action is needed to realize the potential of digital transformation for human development in Montenegro? The rest of this chapter details this agenda.

Table 5.1 From 'business as usual' to a digital Montenegro: four scenarios

Policy space	Business as usual	Realistic scenario	Optimistic scenario	Digital Montenegro scenario
<b>Reducing administrative burden and strengthening e-governance</b>	<ul style="list-style-type: none"> <li>Start-up, enterprises and foreign investors: high cost</li> <li>Governance: low level of transparency and stability</li> <li>Labour regulations: complex</li> </ul>	<ul style="list-style-type: none"> <li>Start-up, enterprises and foreign investors: high cost</li> <li>Governance: medium level of transparency and stability</li> <li>Labour regulations: complex, but more flexible employment and easier contract termination for poor performance</li> </ul>	<ul style="list-style-type: none"> <li>Start-up, enterprises and foreign investors: lower costs</li> <li>Governance: medium level of transparency and stability</li> <li>Labour regulations: simplified, with flexible employment and easier contract termination for poor performance</li> </ul>	<ul style="list-style-type: none"> <li>Montenegro joins EU, receiving full access to structural funds</li> </ul>
<b>Cultivating entrepreneurship</b>	<ul style="list-style-type: none"> <li>Remains low</li> <li>Entrepreneurial culture and open-mindedness: not encouraged</li> <li>Secondary school and university graduates: prefer stable public sector jobs, but the sector will face pressure to cut spending if growth slows</li> </ul>	<ul style="list-style-type: none"> <li>Medium</li> <li>Entrepreneurial culture and open-mindedness: somewhat encouraged</li> <li>Start-up culture: slowly introduced</li> <li>Science parks: visible with higher funding</li> <li>Secondary school and university graduates: prefer stable public sector jobs, but the sector will face pressure to cut spending if growth slows</li> </ul>	<ul style="list-style-type: none"> <li>Increases</li> <li>Entrepreneurial culture and open-mindedness: encouraged</li> <li>Start-up culture: notable</li> <li>Science parks: visible with higher funding</li> <li>Secondary school and university graduates: increasingly private sector jobs and establish own companies</li> </ul>	<ul style="list-style-type: none"> <li>Entrepreneurial spirit grown due to training and education at all levels, and more people establish new companies in all sectors</li> <li>Secondary school and university graduates: prefer private sector jobs and to establish own companies</li> <li>Many university graduates establish start-up companies</li> </ul>

Policy space	Business as usual	Realistic scenario	Optimistic scenario	Digital Montenegro scenario
<b>Encouraging state-owned or private to innovate digital solutions</b>	<ul style="list-style-type: none"> <li>• State-owned: low efficiency and profit</li> <li>• Private enterprises: increase efficiency by automation, displace unskilled and lowly skilled jobs</li> <li>• Reskilling system: none</li> <li>• Unemployment: increase</li> <li>• GDP: highly negative growth</li> </ul>	<ul style="list-style-type: none"> <li>• State-owned: low efficiency and profit, face the pressure to employ less</li> <li>• Private enterprises: increase efficiency by automation, displace unskilled and lowly skilled jobs</li> <li>• Reskilling system: partial</li> <li>• Unemployment: moderately increase</li> <li>• GDP: moderately negative growth</li> </ul>	<ul style="list-style-type: none"> <li>• State-owned: medium efficiency but low profit, face the pressure to employ less</li> <li>• Private enterprises: increase efficiency by automation, displace unskilled and lowly skilled jobs</li> <li>• Reskilling system: building digital skills</li> <li>• Unemployment: slight increase</li> <li>• GDP: slightly negative growth</li> </ul>	<ul style="list-style-type: none"> <li>• State-owned: automate activities, employ significantly less</li> <li>• Private enterprises: increase efficiency by automation, displace unskilled and lowly skilled jobs</li> <li>• Reskilling system: building digital skills</li> <li>• Unemployment: not increase</li> <li>• GDP: stable growth continues</li> </ul>
<b>Transport infrastructure</b>	<ul style="list-style-type: none"> <li>• Increasingly a bottleneck to human development</li> </ul>	<ul style="list-style-type: none"> <li>• Increasingly a bottleneck to human development</li> </ul>	<ul style="list-style-type: none"> <li>• Increasingly a bottleneck to human development</li> </ul>	N/A – or indifferent?
<b>Export of goods and services</b>	<ul style="list-style-type: none"> <li>• No growth, value and competitive advantage of local products low</li> </ul>	<ul style="list-style-type: none"> <li>• No growth, value and competitive advantage of local products low</li> <li>• Few initiatives cluster development and export promotion without much financial success</li> </ul>	<ul style="list-style-type: none"> <li>• No growth, value and competitive advantage of local products low</li> <li>• More initiatives cluster development and export promotion with moderate financial success</li> </ul>	
<b>ICT positioning</b>	<ul style="list-style-type: none"> <li>• Considered a horizontal industry sector</li> <li>• Initiatives to promote as priority sector for new students, foreign investors: none</li> </ul>	<ul style="list-style-type: none"> <li>• Considered a horizontal industry sector</li> <li>• Initiatives to promote as priority sector for new students, foreign investors: few between ICT and agriculture and tourism</li> </ul>	<ul style="list-style-type: none"> <li>• Considered important vertical industry</li> <li>• Initiatives to promote as priority sector for new students, foreign investors: more government incentives and subsidies</li> </ul>	<ul style="list-style-type: none"> <li>• ICT industry no longer a horizontal industry sector but essential growth engine</li> </ul>

Policy space	Business as usual	Realistic scenario	Optimistic scenario	Digital Montenegro scenario
<b>ICT usage by private sector</b>	<ul style="list-style-type: none"> <li>Usage: remains low</li> <li>Global e-commerce: unmet potential</li> </ul>	<ul style="list-style-type: none"> <li>Usage: medium</li> <li>Global e-commerce: unmet potential</li> </ul>	<ul style="list-style-type: none"> <li>Usage: increasing</li> <li>Global e-commerce opportunities: increasing use</li> </ul>	
<b>Educational supply and demand</b>	<ul style="list-style-type: none"> <li>Mismatch between educational supply and demand: increasing</li> <li>Government funding for universities to educate more people with ICT skills: low</li> </ul>	<ul style="list-style-type: none"> <li>Mismatch between educational supply and demand: decreasing</li> <li>Government funding for universities to educate more people with ICT skills: moderately increasing</li> </ul>	<ul style="list-style-type: none"> <li>Mismatch between educational supply and demand: rapidly decreasing</li> <li>Government funding for universities to educate more people with ICT skills: steadily increasing</li> </ul>	
<b>Start-up ecosystem</b>	<ul style="list-style-type: none"> <li>Montenegro success stories: none</li> <li>ICT talent: prefers to freelance unofficially, not pay taxes</li> <li>Venture capital funds: none</li> </ul>	<ul style="list-style-type: none"> <li>Montenegro success stories: none</li> <li>ICT talent: prefers to freelance unofficially, not pay taxes</li> <li>Venture capital funds: none</li> </ul>	<ul style="list-style-type: none"> <li>Montenegro success stories: one</li> <li>ICT talent: prefers to freelance officially, as simple <i>lex specialis</i> in place for digital nomads</li> <li>Venture capital funds: professionally managed network of regional business angels</li> </ul>	<ul style="list-style-type: none"> <li>Montenegro success stories: 2-3 globally recognized; 1-2 successful start-up exits</li> <li>ICT talent: prefers to work in start-ups employing 1,000+; HQs in USA or Europe</li> <li>Venture capital funds: one state-backed venture capital fund and a professionally managed network of business angels</li> </ul>
<b>Facilitating Foreign Direct Investment (FDI)</b>	<ul style="list-style-type: none"> <li>Inflow: no change</li> <li>Investment promotion: uncoordinated across government agencies</li> <li>Visibility and marketing: directed towards tourism</li> </ul>	<ul style="list-style-type: none"> <li>Inflow: no change</li> <li>Investment promotion: coordinated under new Investment Promotion Agency, no clear vision</li> <li>Visibility and marketing: directed towards tourism</li> </ul>	<ul style="list-style-type: none"> <li>Inflow: increasing</li> <li>Investment promotion: coordinated under new Investment Promotion Agency, with clear vision, reporting plan and responsibilities</li> </ul>	<ul style="list-style-type: none"> <li>3+ venture capital funds support growth and internationalisation of Montenegrin start-up companies.</li> <li>FDI strategy and a single responsible institution attracts new investors with official representatives at key foreign markets</li> </ul>

Policy space	Business as usual	Realistic scenario	Optimistic scenario	Digital Montenegro scenario
<b>Shifts in tourism</b>	<ul style="list-style-type: none"> <li>• Grows, remains large employer</li> <li>• Seasonality of jobs: remains</li> <li>• Tourists from Asia, especially from China: Continue</li> <li>• Opportunities for new companies: grow</li> </ul>	<ul style="list-style-type: none"> <li>• Grows, remains large employer</li> <li>• Seasonality of jobs: remains</li> <li>• Tourists from Asia, especially from China: continue</li> <li>• Opportunities for new companies: grow</li> </ul>	<ul style="list-style-type: none"> <li>• Grows, but no longer large employer</li> <li>• Seasonality of jobs: remains</li> <li>• Tourists from Asia, especially from China: continue</li> <li>• Opportunities for new companies: grow, with automation of services</li> </ul>	<ul style="list-style-type: none"> <li>• Declining</li> <li>• Increasingly automated by systems of web-based reservations</li> <li>• Sharing economy booms with AirBnB</li> <li>• Smaller-scale solutions use blockchain technology for trustworthy transactions without mediators</li> </ul>
<b>Agriculture productivity</b>	<ul style="list-style-type: none"> <li>• Remains a sector with low efficiency and low added value</li> </ul>	<ul style="list-style-type: none"> <li>• Remains a sector with low efficiency and low added value</li> <li>• First export tests with newly branded local products</li> </ul>	<ul style="list-style-type: none"> <li>• Remains a sector with low efficiency and low added value</li> <li>• First export tests with newly branded local products</li> </ul>	<ul style="list-style-type: none"> <li>• Increasingly automated by Internet-of-Things systems</li> <li>• Enabled customers follow growth and market journeys of crops and livestock from start to end</li> </ul>

Source: Team of authors

## Towards a digital Montenegro

A starting point to realize Montenegro’s digital potential is to strengthen the enabling environment for digital policy. The current strategy for the development of an information society in Montenegro is described in the document “Strategy for the Information Society Development 2020”. This document outlines a digital development strategy which, along with the ICT technologies in the key development areas, also deals with the problem of the lack of ICT skills, which is significantly slowing down the multiplicative effects that the modern technologies have on productivity growth.

Furthermore, during the time of preparation of this report, the upcoming 2021–2025 Digital Transformation Strategy was under finalization to determine the strategic goals to enable transformation in the economy, organizations and new business models. A digital roadmap would benefit from taking a human development approach, as we argue that the pillars of Montenegro’s digitalization policy framework must maintain inclusion, equity and wellbeing at their core. A step-by-step process can bring into focus equity issues including: ensuring citizenship participation, equality, anti-discrimination, promotion of public values and consideration of the environmental impact of the technologies adopted.

## Mastering digital skills, reskilling the workforce

Given the immediate and long-term implications of digital transformation on jobs for Montenegrins, significant changes in education and reskilling of the current and future workers is a leading priority.

- **Mastering digital skills.** Improve the informing and educating of people in Montenegro about the benefits of using and mastering ICT. Teach in primary school computational thinking in combination with teaching problem solving and critical thinking in other subjects, rather than just focusing on teaching computer programming. Align the vocational education curricula in ICT with the digital skills covered by the European Computer Driving Licence (ECDL) modules. Introduce a formal framework and monitoring system for vocational studies in ICT.
- **Reskilling the workforce.** Long-term planning and direction of the workforce towards the adoption of new and advanced skills to encourage a workforce eager to adopt new and advanced skills. Targeting of courses in ICT of continuous education at older adults aged 45 and above and subsidizing of such courses for people with a low level of income to decreased geographical and financial inequality.
- **Institutionalize a think-tank to craft a new enrolment policy for Montenegro's higher education institutions and align learning objectives with possible future job roles.** The think-tank should consider the specific needs of the Montenegro's society, contemporary trends in higher education, and the development of new technologies and new professions. In higher education, the focus should be on preparing graduates for emerging digital job roles. This recommendation also includes establishing a dialogue between the employers and institutions of higher education about the job roles needed and the concrete technical, cognitive and socio-emotional skills that these should entail.
- **Update education curricula and the accreditation processes across the education system.** More adequate and flexible curricula. This recommendation entails reconsidering the role of sector-level commissions in adopting and adjusting the curricula of higher education.

## Expanding digital infrastructure

A priority for advancing digital infrastructure is viewing ICT as an enabling force for economic growth and human development – as a vertical priority rather than a horizontal one.

- **Subsidize internet access to close the digital divide.** The average person in Montenegro earns less in the rural areas and particularly in the northern part of the country. The effects of this can be seen also in the increase in the number of people working remotely in smaller cities and towns and in rural areas. This would decrease geographical and financial inequality.
- **Build trust towards using e-services and e-commerce to increase the usage of e-services and e-commerce.** The introduction of clear administrative structures for planning, developing and maintaining ICT solutions is needed. The administrative structures may be centralized or decentralized. In the first case, an institution that is horizontal to "silos" or ministries and governmental agencies coordinates the designing and implementation of registries and information systems, data exchange infrastructure and public e-services. In the second case, all the ministries and governmental agencies are responsible for their own registries, information systems and e-services, and the CIO of the government coordinates the activities.

- **Lay the foundation for efficient communication between citizens and the government.** The public e-services should be based on the needs of citizens. Therefore, the information about the needs of the citizens should be communicated from the citizens or officials to the higher-level public institutions. There should be a feedback loop explaining why one or another idea is not a good one or should be fostered into planning and development. After development, the implementation activities must send clear messages to the focus groups, and that feedback should be considered in further amendments.

## Strengthening the business, start-up and ICT ecosystem

Facilitating the digital business ecosystem would significantly strengthen the opportunities for digital transformation from within Montenegro – simplifying the process of registering a company online and digitally managing e-commerce, taxation and other areas related to running a company will improve the overall business environment and increase tax revenue.

- **Improved business environment.** Facilitating the ease of doing business will lead to more firms in Montenegro, a higher ranking on the World Bank's *Doing Business* index and increase tax revenue.
- **Streamline.** Continuing to streamline opportunities via a single entity in charge of investments, export promotion and foreign investor aftercare services will support growth in FDI and exports.
- **New digital incentives and subsidies.** These can include digitalization in the new solutions to be introduced in manufacturing, construction, agriculture, tourism and other areas, wherever appropriate.

## Using innovation as a platform for digital transformation

Creating a strategy and a clear action plan to grow Montenegro's research and development (R&D) spending will strengthen the business environment and pave the way for innovation to spearhead digital growth. Reducing interference in the market by keeping a broad legal definition of start-ups would allow the market to decide success based on the technology used by the company and its growth rate.

- **Launch and initiate a start-up investment fund.** Appoint an internationally experienced private company or start-up fund to manage start-up investments made together with public money. Partner up with another government fund or a private fund that has been successful in supporting the growth of start-ups. Introduce incentives directed at supporting start-ups.
- **Support and further fund the activities of technological parks, incubators and accelerators.** They should be the creators and keepers of Montenegro's start-up register and serve as a resource to improve the start-up ecosystem.

## Transitioning to public administration e-services

- **Implement a comprehensive Public Service Portfolio Management (PSPM) system.** This tool will add significant value to the information society for public service development.

- **Use legislative change management as a tool for removing all obstacles from the electronic communication and public service delivery processes.** This will decrease the administrative burden for citizens and businesses but will not offer a one-time solution, but rather a continuous-change management process. A precondition for data exchange between registries is the existence of a unified system for electronic data exchange between public institutions and administrative bodies. While there may be special requirements in other legislative acts that hinder the usage of an electronic format, electronic communications are still not always possible. Such potential obstacles need to be identified and dealt with through legislative reform.
- **Involve the data protection authority in all important developments of e-services and e-governance.** Increased control over data and privacy protection is necessary to increase trust in the information society.
- **Vest the Ministry of Public Administration with the authority to assess the ICT investments in all state administration bodies.** The purpose of the assessment is to ensure that the investments are made in accordance with the state's and authorities' strategies. Holistic development of the ICT infrastructure optimizes investments and ensures reusable systems. If implemented, the MPA will lead and manage cooperation across ministerial and agency boundaries as an approach to mitigate the risks of building silo-based e-governance in Montenegro.
- **Educate civil servants about the new opportunities of e-service delivery, according to the new regulations, beyond the IT units of the government.** This will decrease the administrative burden for citizens and businesses on the one hand, and will increase the efficiency of the public administration on the other.
- **Streamline the e-government portal.** Provide the e-government portal with a standard set of commonalities independent of the particular service, such as shared payment services, an identification service and so on will facilitate implementation of e-services and improve penetration of e-service usage. As a quick-won victory in the development of e-services, this will help promote the added value of e-governance and generate demand.

## Establishing a coordination body for the development of digital solutions

Creating a unified and coordinated leadership position can serve to consolidate Montenegro's digital pathways forward. Until 2016, Montenegro had a Ministry of Information Society composed of four directorates to support the prime minister in harnessing the power of data, innovation and technology. This ministry was abolished, and its responsibilities redistributed among the Ministry of the Economy and the Ministry of Public Administration (MPA), with the MPA assuming the role of Directorate for Information Infrastructure. This has challenged effective innovation and digitalization initiatives through a whole-of-government approach.

A possible response to this is to establish an ICT Network cutting across ministries, led by a chief information officer (CIO). Such a CIO could provide leadership in reframing the institutional arrangements to enhance the efficiency of digital governance. This could parallel the existing Strategic Planning Network, the first forum for civil servants working to create and report on the implementation of the strategy. Similarly, the ICT Network can work to connect experts/civil servants responsible for ICT, especially from ministries whose projects and activities are ICT-intensive. Closer cooperation, the exchange of information and development of ITC services in accordance with the goals of digital transformation would be ensured.

The role of the CIO could be to serve at the cabinet level while maintaining direct oversight to:

- Support the prime minister's office in harnessing the power of data, innovation and technology.
- Upgrade government capacity to use the applied technology, strengthen government services and cost efficiencies, ensure increased transparency and help upgrade government agencies to use open data and expand their data science capabilities.
- Establish a government-wide enterprise architecture that ensures system interoperability and information sharing and maintains effective information security and privacy controls across the national government.
- Design, harmonize, develop and facilitate e-government and information systems, as well as the infrastructure of state administration bodies and government services.
- Develop and implement standards to introduce and support the use of ICT in state administration bodies and government services.
- Design, develop and maintain a computer network of government bodies.
- Provide services to design, develop and implement internet access, services and other centralized electronic services.
- Plan the development and procurement of computer and communication equipment for the needs of state administration bodies and government services.

## Choosing Montenegro's digital future

Multiple digital economy scenarios are facing Montenegro. None is inevitable. But they represent the outcomes of a range of choices that Montenegro can make. The key is to determine the policy objectives needed to realize the digital future people of Montenegro want.

## Technical note: Methodology for creating automation scenarios

The analysis in this section (to the extent possible) targets different potential scenarios, which are of relevance for the efficient management of human capital in Montenegro. Official development documents, MONSTAT data and the Bain Macro Trends Group 2018 report *Labour 2030: The Collision of Demographics, Automation and Inequality* served as the background for developing the scenarios, along with statistical extrapolations of the trends of relevant indicators. The analysis of the scenarios is not based on sophisticated statistical software, and the time series of the available data in Montenegro are not sufficiently long to enable reliable conclusions concerning the development of specific indicators.

The scenarios are not intended to ‘forecast the future’. Instead, their purpose is to encourage reflection on the possible options and to illustrate the possible outcomes of different policy choices, identify challenges and enable comparison with EU trends. Based on this, the scenarios may serve as a basis to propose specific targets and measures to achieve greater efficiency of use of human capital in the country.

In preparing the scenarios, attention was focused on the average gross value added per employee (GVA/E) as it is a composite indicator for productivity of work. The GVA/E indicator also indirectly measures automation because if the number of employees in an economic sector is stable or is decreasing and the value of GVA/E is increasing at the same time, the most likely reason for this is the pace of automation in the given economic sector.

### How to measure the impact of automation?

Gross output is defined as the market value of produced goods and services. It is calculated by activities at approximate basic prices, since all subsidies are treated as subsidies on products and included in the calculation of the level of the national economy. Intermediate consumption at purchase prices is the value of goods and services which are transformed, used and consumed in the production process. Gross value added (GVA) is the value of gross output minus the value of intermediate consumption. GVA is the measure of the value of goods and services produced in an area, industry or sector of an economy.<sup>1</sup>

The impact of automation can be measured with the help of the average gross value added per employee (GVA/E), which is calculated by dividing the sum of the gross value added by the total number of employees who have been active in a given period in an area, industry or sector of an economy. For example, in Montenegro the gross value added in the manufacturing industry was €137,803 in 2017 and the number of employees active in manufacturing in 2017 was 11,609. If we now divide the gross value added in manufacturing in 2017 by the total number of employees who were active in manufacturing in the same year, we get a gross value added of €11.86 per employee in the manufacturing industry in 2017. GVA/E is one of the measures of labour productivity.

The labour productivity in a given country increases at a certain rate because of improvements in operating methods and/or processes and the adoption of new technologies. The impact of automation is measured by the incremental additional monetary increase in the gross output per worker, which excludes baseline forecasts of labour productivity growth.<sup>2</sup> Such additional productivity growth in an area, industry or sector of an economy in a given period multiplied by the number of workers who have been in the given period active in the area, industry or sector gives us the gross value added in the given period because of automation.

The Bain Macro Trends Group has analysed a range of technologies at or near commercialization, including humanoid service robots, collaborative robots (cobots), drones, artificial intelligence and machine learning algorithms.<sup>3</sup> These technologies will primarily transform the service sector of the most advanced economies and some emerging economies.

The next wave of such labour-augmenting automation technology could lead to an average labour productivity increase across sectors of about 30% compared to 2015, with the impact rising over time.<sup>4</sup> This step-change improvement varies considerably by industry and ranges from relatively modest levels in healthcare and education services to a substantial impact in industries such as food service, retail, transportation and warehousing.<sup>5</sup>

Productivity growth caused by automation may range from as low as 0.6% per year to as much as 4.5%, averaging 2% to 3% per year. Even in a delayed scenario in which industries adopt automation more gradually until 2040, the labour productivity gains from automation would still average more than 1% a year.<sup>6</sup>

The input data to be used for the digital economy scenarios in Montenegro is summarized in Table A.

Table A: Input data for the digital economy automation scenarios for Montenegro

	2010	2011	2012	2013	2014	2015	2016	2017
<b>Number of Employees</b>	161,742	163,082	166,531	171,474	173,595	175,617	177,908	182,368
<b>Gross Value Added (GVA, in constant Euro prices)</b>	2,553,537	2,705,981	2,674,356	2,776,312	2,810,549	2,906,885	3,093,726	3,423,029
<b>Gross Value Added per Employee (GVA/E, in constant Euro prices)</b>	15.787718	16.592763	16.059208	16.19083	16.19026	16.552412	17.389471	18.769899

Source: MONSTAT, 2019c

We calculated the values of the average annual growth of the number of employees (1.73%) and the average annual growth of the gross value added per employee (GVA/E) (4.29%). These values serve as starting points for extrapolating the digital economy automation scenarios presented in Chapter 2.

In creating digital economy automation scenarios for Montenegro, we extrapolated time series based on the average growth in the values of GVA/E and in the number of employees in the years 2010–2017. We developed different scenarios by changing the value of the additional growth of GVA/E caused by automation only, as well as the value of the annual growth of the number of employees and annual growth of the gross value added per employee. As a result, we created five scenarios, which are all represented in Table B.

- The first scenario – presented in row 1 – uses the average value of GVA/E growth and the average value of the growth of the number of employees and assumes that the additional annual increase in the value of GVA/E caused by automation only is 0.6%.
- The second scenario – presented in row 2 – uses the average value of GVA/E growth and the average value of the growth of the number of employees and assumes that the additional annual increase in the value of GVA/E caused by automation only is 2%.

- The third scenario – presented in row 3 – uses the average value of GVA/E growth and the average value of the growth of the number of employees and assumes that the additional annual increase in the value of GVA/E caused by automation only is 4.5%.
- The fourth scenario – presented in row 4 – uses the average value of GVA/E growth and assumes that the number of employees grows by 3% per year and that the additional annual increase in the value of GVA/E caused by automation only is 2%.
- The fifth scenario – presented in row 5 – uses the average value of the growth of the number of employees and assumes that the value of GVA/E grows by 3% per year and that the additional annual increase in the value of GVA/E caused by automation only is 2%.

Table B: Projections on digital economy automation scenarios for Montenegro

Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Additional growth of GVA/E 0,6%	1079	1098	1117	1136	1156	1176	1196	1217	1238	1260	1281	1303
Additional growth of GVA/E 2%	3548	3610	3672	3736	3800	3866	3933	4001	4070	4141	4212	4285
Additional growth of GVA/E 4.5%	7793	7928	8065	8204	8346	8491	8638	8787	8939	9094	9251	9411
Growth of the number of employees 3% per year	7781	7937	8096	8258	8423	8591	8763	8938	9117	9299	9485	9675
Annual growth of GVA/E: 6% per year	3491	3552	3613	3676	3739	3804	3870	3937	4005	4074	4144	4216

Source: Extrapolated by the lead author based on the data in MONSTAT, 2019c

# Notes

## Overview

- 1 EC, 2019a
- 2 NHDR, 2016
- 3 WB, 2018a

## Chapter 1

- 1 UNDP, 2020
- 2 MONSTAT, 2019m
- 3 MONSTAT, 2019m
- 4 MONSTAT, 2019m; IPSOS 2018
- 5 MONSTAT, 2019b
- 6 IPSOS, 2018
- 7 Ibid.
- 8 Ibid.
- 9 Ibid.
- 10 Ibid.
- 11 IPPR 2015
- 12 Ibid.
- 13 UNDP, 2019
- 14 WB, 2016
- 15 Ibid.
- 16 UNDP, 2020, Statistical Annex, Table 2
- 17 UNDP, 2020
- 18 Ibid.
- 19 MONSTAT, 2019s
- 20 NHDR, 2016
- 21 MONSTAT, 2019s
- 22 NHDR, 2016
- 23 Ibid.
- 24 The dependency ratio (old-age dependency ratio) is the ratio of the population older than 65 to the working-age population.
- 25 Čok, & Sambt, 2011
- 26 UN, 2020
- 27 NHDR, 2016
- 27 OECD 2020
- 28 OECD, 2020
- 29 OECD, 2020
- 30 IMF, 2020
- 31 Institute for Strategic Studies and Prognoses, Montenegro
- 32 IPSOS, 2018
- 33 UN, 2020b
- 34 Ibid.
- 35 Clement, 2020
- 36 Kovacevic, & Kascelan, 2020
- 37 MONSTAT, 2019t
- 38 EU, 2019
- 39 EKIP, 2020
- 40 Ministry of Economy Affairs, personal communication

## Chapter 2

- 1 EBRD, 2018
- 2 WB, 2018a
- 3 NHDR, 2016
- 4 Atoyán and Rahman, 2017; NHDR, 2016
- 5 WIIW, 2019
- 6 WIIW, 2019
- 7 EC, 2019a
- 8 MFIC, 2018
- 9 MFIC, 2018
- 10 AmCham, 2018
- 11 EC, 2019a
- 12 Bain, 2018
- 13 PwC, 2018c
- 14 WEF, 2018
- 15 WEF, 2018
- 16 WEF, 2018
- 17 WEF, 2018
- 18 WEF, 2018
- 19 Bain, 2018
- 20 WEF, 2018
- 21 Under the category "Accommodation and food services" in (Bain, 2018)
- 22 Under the category "Retail" in (Bain, 2018)
- 23 Under the category "Wholesale trade" in (Bain, 2018)
- 24 Under the category "Transportation and warehousing" in (Bain, 2018)
- 25 Under the category "Mining and oil & gas extraction" in (Bain, 2018)
- 26 Under the category "Utilities" in (Bain, 2018)
- 27 Under the category "Utilities" in (Bain, 2018)
- 28 Under the category "Agriculture" in (Bain, 2018)
- 29 Under the category "Information" in (Bain, 2018)
- 30 Under the category "Other services" in (Bain, 2018)
- 31 Under the category "Administrative and support" in (Bain, 2018)
- 32 Under the category "Finance and insurance" in (Bain, 2018)
- 33 Under the category "Professional services" in (Bain, 2018)
- 34 Under the category "Federal, state and local government" in (Bain, 2018)
- 35 Under the category "Healthcare and social assistance" in (Bain, 2018)
- 36 Under the category "Real estate (rental and housing)" in (Bain, 2018)
- 37 Under the category "Educational services" in (Bain, 2018)
- 38 Bain, 2018
- 39 Bain, 2018; WEF, 2018; Frey and Osborne, 2013
- 40 OECD, 2016
- 41 OECD, 2016
- 42 Frey and Osborne, 2013
- 43 OECD, 2016
- 44 OECD, 2016
- 45 OECD, 2016
- 46 OECD, 2016; Sterling & Taveter, 2009; Autor, 2013
- 47 WB, 2018a
- 48 WB, 2018a

- 49 WB, 2018a
- 50 WB, 2019b
- 51 EC, 2018
- 52 McCue, 2018
- 53 WB, 2018b
- 54 GoM, 2019
- 55 MoS, 2020a
- 56 MoS, 2020b
- 57 GoM, 2019
- 58 GoM, 2018; GoM, 2019
- 59 EC, 2018
- 60 IPSOS, 2018
- 61 WB, 2019b
- 62 Reichenberger, 2018
- 63 WYSE, 2018
- 64 ERR, 2020
- 65 e-Residency, 2019
- 66 e-Residency, 2019
- 67 Westerman, Bonnet and McAfee, 2014
- 68 S3, 2018
- 69 MONSTAT, 2019b
- 70 MoS, 2018
- 71 IPSOS, 2018
- 72 IPSOS, 2018
- 73 IPSOS, 2018
- 74 IPSOS, 2018
- 75 Bain, 2018
- 76 Bain, 2018
- 77 MONSTAT, 2019c
- 78 NHDR, 2015
- 79 Kosciuszko Institute, 2019, p. 24
- 80 Kosciuszko Institute, 2019
- 81 International Federation of Robotics
- 82 IFR, 2018b
- 83 PwC, 2018a
- 82 UNESCO, 2020
- 83 Čavalić, 2017
- 84 ERR, 2017
- 85 Cegielski, and Rogers, 2016.
- 86 Acemoglu, and Restrepo, 2020
- 87 Sterling, and Taveter, 2009
- 88 Ministry of Science, personal communication

## Chapter 3

- 1 Ipsos, 2020
- 2 WB, 2019b
- 3 UNICEF, 2016
- 4 UNICEF, 2016
- 5 OECD, 2019a
- 6 UNICEF, 2016
- 7 MoE, 2016
- 8 IEP, 2014
- 9 MoE, 2016
- 10 IEP, 2014
- 11 MoE, 2016
- 12 MoE, 2016; EAM, 2020
- 13 IEP, 2014
- 14 MoE, 2016
- 15 IEP, 2014
- 16 Wing, 2008
- 17 Kemp, 2019
- 18 MoE, 2014
- 19 CGMP, 2018
- 20 PwC, 2019d
- 21 PwC, 2018d
- 22 CIEIT, 2019
- 23 Ibid.
- 24 WB, 2019a
- 25 MoE, 2016
- 26 Ipsos, 2018
- 25 Calatrava, 2020
- 26 OECD, 2020
- 27 EXIT, 2020
- 28 UNICEF, 2020a
- 29 UNSDG, 2020b
- 30 EC, 2019b
- 31 TheGlobalEconomy.com, 2020
- 32 VICICT4.WOMEN, 2020
- 33 Supergirls, 2020
- 34 TechSisters, 2020
- 35 GirlsWhoCode, 2020
- 36 WB, 2020b
- 37 OECD, 2019b

## Chapter 4

- 1 Booz & Co, 2010
- 2 Proposal of Analysis of the status of electronic services with a proposal of measures for their improvement – Ministry of Public Administration of Montenegro
- 3 Booz & Co, 2010
- 4 Milošević, 2018
- 5 PwC, 2014
- 6 Booz & Co, 2010
- 7 PwC, 2014
- 8 Booz & Co, 2010

## Technical Note

- 1 MONSTAT, 2019c
- 2 Bain, 2018
- 3 Bain, 2018
- 4 Bain, 2018
- 5 Bain, 2018
- 6 Bain, 2018

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