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# ICT as a driver for further development of Montenegro

***SURVEY ON THE CURRENT AND POTENTIAL IMPACT OF ICT ON THE DEVELOPMENT OF MONTENEGRO***

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This survey was conducted by Ipsos Strategic Marketing for the purposes of the United Nations Development Program Office (UNDP Montenegro), in order to produce the Human Development Report for 2018 on the topic of current and potential impact of ICT on Montenegro's development.

The views and opinions expressed in this survey do not necessarily reflect those of the partners in the Program.
All terms in this report mentioned in the masculine gender refer to the same terms in the feminine gender and vice versa.

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## Internet usage, citizens' digital competencies and views on ICT

**According information obtained from citizens, 18 to 65 years old, in this part of population 76% of households have internet access.** About half of citizens who do not have internet access in their household cite disinterest in using the internet (47%), while the other half cite other objective reasons: 28% stated that the internet is not financially attainable to their household (too expensive for them), 16% that they do not have the necessary knowledge and skills to use the internet, and 9% cited lacking infrastructure (network coverage) to be able to use the internet.

**However, there is a correlation between the access to the internet and households' financial resources - thus, 57% of households with an average income of up to € 300 have internet access, while this is the case in 90% in households with income over € 600.**

**In the 18-65 age group, 22% of citizens do not use the internet at all, while 78% reported that they at least occasionally use the internet** (whether because they have the possibility to use the internet at home or they use it elsewhere)**. However, a much smaller percentage, i.e. 63%, regularly use the internet: 51% use it daily and 12% use it frequently - several times per week.**

**For most users, the internet is primarily a means of communication with people and entertainment (music, movies, games…), but to a great extent also a source of information in a wide range of areas - from social and political events, daily life advice, information needed for schooling, studying, working or training. The internet is used the least for e-services, of any domain** (banking services, shopping, travel reservations, public administration services, etc.)

**Nearly two-fifths of citizens (38%) do not have a sufficient level of digital skills to use the internet, i.e. they are either completely digitally illiterate (22%) or, based on their self-assessment, they have only the most basic internet use skills (16%).** On the other hand, **just over a third of citizens (36%) estimate that they have enough skills to mostly or completely achieve what they want on the internet with ease.** Finally, approximately one in four citizens (26%) assesses their internet skills as average.

**The survey found that there are significant differences among citizens regarding the use of the internet and digital competences for its use**, **with the age structure of citizens being the key dimension of the digital divide of the society, but the gap is also evident in the educational structure of citizens.** Specifically, the frequency of internet use, as well as the level of digital skills, are systematically declining with age, and increasing with the level of education. So for example, in the 56-65 age group, 65% of citizens stated that they never use the internet, while in the group with just primary education, 37% said the same. Additionally, only 3% of 56-65 year olds have a high level of internet usage skills, compared to 71% of 18-25 year olds. Similarly, among the citizens with basic and primary education, 27% estimated that they had a high level of skills in using the internet, while this was the case for 32% of those with secondary and 54% of citizens with university education.

**Most citizens (77%) believe that ICTs have generally had a positive impact and contributed to the advancement of various segments of people's lives in Montenegro.** Although the majority considers the ICT's contribution to be positive in all areas, the benefits of using ICT are more visible to citizens in their daily lives than in the areas of economic development, and the least in the area of democratization of society. The use of e-services in the everyday life of citizens is among the three positive contributions of ICT with the lowest influence on their lives.

Notwithstanding the aforementioned, **citizens also recognize the negative consequences of the use of ICT, especially in regard to social relations, which are recognized in the widespread opinion that the mass use of these technologies has led to alienation of people and general dehumanization of society** (with which 77% of citizens agrees).

**This is also evidenced by the finding that, although communication with other people is the most widespread area of ICT use in everyday life, and the area where citizens most positively assess the contribution of ICT to improving their lives, when it comes to content of communication, close to half of citizens (49%) still give preference to direct face-to-face communication**.

It is also important to point out that **attitudes on the impact of mass use of ICT on people's lives vary greatly depending on the intensity of use of the internet, age and level of education** - positive attitudes about the effects of ICT on citizens' lives are more prevalent among active internet users, younger generations and well-educated citizens. **On the other hand, the view that the widespread use of ICT has led to alienation of people and the general dehumanization of society is almost equally present in all age and education groups of citizens** .

**It is interesting that the citizens perceive more the positive impacts of ICT on the lives of people in Montenegro in general, than on their personal lives.** Nearly two-thirds of citizens (63%) say that the use of ICT has had a positive impact on their own lives, while three-quarters (77%) say that these technologies have improved the lives of people in Montenegro in general. **It is also important to emphasize that the impression that new technologies have improved people's lives in general more than their own lives varies greatly depending on the frequency of use of the internet.** Non-users and rare users of the internet are 35 percentage points less likely to believe that digital technologies have improved their own lives than the lives of people in general, while in the case of active internet users this difference is only 5 percentage points.

**The key divide in attitudes towards the contribution of digital technologies to changes in citizens' personal lives, just as in the case of attitudes toward their impact on people's lives in general, is based on the intensity of internet use, age and education level.** While 85% of active internet users estimate that the penetration of ICT has improved their own lives, only 53% of occasional users and only 13% of non-users and rare internet users consider the same. Likewise, the **feeling that nothing has changed with the penetration of new technologies in their lives is much more common among senior citizens than among younger citizens, as well as among less educated citizens rather than among citizens with secondary and university education**.

**Citizens of Montenegro, however, tend to see the use of ICT rather as a chance to improve the lives of all citizens regardless of their socio-economic status (31%), or even to reduce differences between different socio-economic groups (31%), than as an advantage available only to the part of society that widens the gap between citizens with lower and those with higher socio-economic status (27%)**.

**However, the feeling that ICTs have contributed to the division of society is more pronounced among citizens who use these technologies less or do not use them at all - senior citizens and less educated citizens.** Differences in the belief that new technologies have divided society are most notable based on the educational structure of citizens

- thus 40% in the group of less educated citizens consider that ICTs have had an impact only on the citizens of higher socio-economic status who have the means to use them.

## Digitalisation of economy in Montenegro

**Representatives of public administration, academia, business associations and the IT sector agree that, at this moment, digitalization of the economy is a priority factor for the economic growth of**

**Montenegro. On the other hand, there is agreement among them that the digitalization of economy in Montenegro is generally at a low level. The reasons for this situation are primarily twofold:**

1. **Lack of awareness among businesses about the importance of digitalization. Namely, there is still no full understanding of the benefits that digitalisation brings to businessmen.** In large number of primarily small businesses, investments in information and communication technologies is still seen as an additional cost, rather than an investment to improve the business operations.
2. **Financial reasons. Digitalisation requires investments that companies, especially small ones, are not ready for.**

**However, representatives of the IT sector are inclined to believe that the problem of financial resources is more a matter of businessmen's awareness of the importance of the digitalization process, rather than objective financial inability. The lack of vision and knowledge, as well as the general disinterest of businessmen, is systematically cited as an overarching problem of greater adoption of new technologies.** As an example in support of the lack of awareness of businessmen, representatives of the IT sector cite lack of awareness of the existence and benefits of using the so called cloud platforms.

**The views of the representatives of the companies covered by this survey largely support the opinions of representatives of institutions and the IT sector about the lack of awareness of a large percentage of businessmen regarding the importance of digitalization for success of their businesses.** Compared to representatives of institutions and IT sector, businessmen are much more satisfied with the current level of digitalisation of the economy - both at the state level and in their own companies, and attach less importance to the role of digitalisation to business improvement, both in their own enterprises and to the development of the economy as a whole. Nearly half of the surveyed representatives of businesses, i.e. 44%, rated the overall state of digitalization of the economy in Montenegro with high grades (very good and excellent). **Business digitalization ratings are even more favourable when respondents rated the degree of digitalization of their businesses higher than they did the general situation in Montenegro** - half of business representatives (50%) rated the digitalization of their businesses as very good or excellent, and only 12% (4 respondents) as bad, or very bad.

**Businessmen's assessments of the state of digitalisation in their enterprises support the assessments of institutions and the IT sector that the situation regarding the digitalisation of economy is particularly problematic in smaller enterprises.** In enterprises with less than 100 employees, only a third of the respondents rate the situation as excellent or very good.

Nearly a third of surveyed business representatives said that their businesses have fewer employees who know how to use computers than what would be necessary for optimal performance – on average 20% less than the optimal number. More than half of the companies, i.e. 57%, said they did not use all the opportunities offered by the internet to improve their business.

When it comes to the perception of the importance of digitalisation, just over a third of business representatives, i.e. 37%, said that digitalisation could greatly contribute to the growth of the Montenegrin economy; 44% think that it can make a significant contribution, and 19% even stated that digitalisation can only slightly contribute to the growth of Montenegro's economy.

**With regard to the contribution of digitalisation to business success in one's own company, an even smaller number of businessmen estimated that greater digitalisation could significantly contribute to business success**. Nearly half, i.e. 47% (15 respondents), said that digitalisation could only contribute slightly, if at all, to a more successful business, 41% said that digitalisation could make a significant contribution, and only 12% that it could contribute a lot.

**Opinions of the representatives of the surveyed companies on obstacles to wider use of digitalization in the economy** of Montenegro is somewhat different from the views of representatives of the IT sector

and state institutions**. While the representatives of the IT sector and public administrations focused on entrepreneurs' lack of awareness on the importance of digitalization and lack of motivation to find solutions despite financial obstacles,** representatives of companies tended to attach more importance to the lack of human resources **(lack of IT professionals and digital skills of employees),** and when it concerns the business of their companies, the issue of infrastructure was mentioned, which should provide better and faster internet connections**. This view is somewhat in line with the** views of academics who especially highlighted the problem of information literacy as a barrier to greater business digitalization.

**In line with the tendency to see the situation in their enterprise as at least slightly better than the state of digitalization of the economy as a whole, businessmen are inclined and see problems in their enterprises as somewhat lesser than the ones in the country as a whole** . A slightly smaller percentage of businessmen see these factors, with the exception of infrastructure, as obstacles to greater digitalisation of their own business, rather than generally at the state level.

**Assessments of business representatives on the state of digital skills of employees in their companies support the general views on the problem of digital literacy in the labour market**. Just over a third of business representatives, **i.e. 35%, said that employees who work in jobs where digital skills are a requirement have a high enough level of skills to do their jobs fully efficiently.** If one adds to this the 19% of businesses in which the digital literacy of employees is rated as very good, it could be said that **just over half of the companies (54%) estimate that their employees mostly, if not fully, have sufficient digital skills for performing their jobs efficiently.**

**Employee's digital skills are rated even lower in companies where the status of digitalization is rated to have been below optimum** - only 38% of them estimate that their employees have a digital skills level that enables them to do their jobs mostly or fully efficiently.

**Regarding the availability of IT professionals in the labour market, 72% of company representatives estimate that there are fewer of them in the labour market than necessary. However, the lack of IT professionals is generally perceived to be much more of a problem for the IT sector than for digital technology users.**

**In principle, the importance of digitalisation for the growth of the economy has also been recognized by the citizens of Montenegro.** The vast majority of citizens agree not only with the view that digitalisation increases business productivity, but also that it is indispensable for the very survival of businesses in the market. **Despite the principal awareness on the importance of digital literacy of citizens for the development and modernization of the society, citizens' assessments of their digital competence in the work they do, as well as the general level of disinterest in enhancing these skills, point to the lack of awareness in the Montenegrin society regarding the dynamics of change brought by the increasing use of digital technologies.**

**Among currently employed citizens, 11% reported having at least one (or more) job-related problems (being forced to change jobs, losing their jobs, not getting a job or giving up from applying for a job) due to a lack of appropriate level of digital skills required for the job.**

**On the other hand, a relatively small percentage of citizens have expressed an interest in acquiring or refining digital skills that would enable them to be more competitive at the job market or to make greater use of the benefits of the internet in their daily lives. In the overall population of 18-65 year-olds, 27% said they were interested** in acquiring or improving their digital skills for greater competitiveness in the labour market, and slightly less than a third, i.e. **31% of citizens see themselves as actively working**[1].

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[1] Whether they are currently employed, or just planning to look for a job or start their own business.

**Interestingly, the disinterest in enhancing one's digital skills is generally more present among citizens with lower level of skills.** In line with this finding**,** the interest in refining digital skills is highest amongst the 18 to 25 year-olds (49%), and declines significantly with age. It is striking that interest is already dropping to 33% amongst the 26 to 35 year-olds.

**The interest in improving one's own digital skills in order to gain greater competitiveness in the labour market is the lowest among the least educated citizens**. As many as 60% of east educated citizens said they were not interested in improving their digital skills for greater competitiveness in the labour market.

Furthermore, **interest is the lowest among manual labour workers, primarily among unskilled workers. Managers are the most interested in improving their digital skills, but even in that group less than half (46%) has shown interest.**

## Digitalization of Public Administration: Public Administration e-Services

Representatives of the IT sector, business associations and academia, albeit more critical of the current state and pace of e-Government advancement, agree with the views of public administration representatives regarding the multiple benefits that digitalisation of public administration services has brought for both users and providers of these services.

**Representatives of the IT sector, business associations and academia assessed that the general level of digitalisation of public administration is lagging behind fast-paced development of ICT and that the quality of digitalisation is very uneven, and varies from one administration to another. They pointed out two drawbacks in particular:**

- **Uneven quality of e-services - insufficiency and lack of support system for some services;**
- **The lack of a centralized, unified system.**

On the other hand, however, **neither the citizens nor the business representatives we spoke with showed enthusiasm for using e-services of public administration at present. Citizens are insufficiently informed and unprepared to accept the new system of administrative services, and a significant number of businessmen do not recognize the existing system of e-services of public administration as a tool that significantly contributes to the improvement of their business.**

**Citizens of Montenegro use e-services in any domain relatively rarely (banking services, shopping, tourist reservations...), and especially e-services provided by the public administration (5%). The results of this survey show that in the total population of 18-65 year olds, less than half (41%) are aware of the possibility of using public administration e-services (whether they have used them, only visited the e-portal, or just heard about them), while 59% are completely uninformed on digitalisation of public administration services (either completely unaware of the possibility of using e-government services, even though they use the internet, or they do not use the internet at all).**

**It is striking that close to half of internet users, i.e. 47%, have never used public administration e-services, although they are aware of this possibility** – 37% have never visited an e-government portal and 10% have visited an e-government portal, but never used any of the services. Finally, among internet users, a considerable percentage, i.e. 46%, do not even know what kind of services are on offer.

**Use of public administration e-services is strongly linked to citizens' education.** Among internet users, public administration e-services are by far the most commonly used by citizens with university education – 17%, then only by 5% of citizens with secondary education, while among internet users with just primary education no one stated that they used these services. More than half of less educated internet users and half of those with secondary education do not even know what these services are.

Illustrative data in support of the fact that it is necessary to inform the business sector about the benefits of using e-services is that **a significant number of businessmen presently do not attach special importance to using e-services of public administration as a tool for improving their businesses, at least not at the current level of development of this tool –** 59% of company representatives stated that their company uses public administration e-services, one in four that their company does not use those services, while 15% were unsure whether these services were being used in their company, which certainly points to little significance these businesses attach to the ability to use these services in their businesses. **It is note-worthy that among the companies that stated that they were using public administration e-services, a vast majority reported that they were using only those e-services that they were required to use by law.**

Barriers to improving the digitalization of public administration, cited by representatives of state institutions, the IT sector and academia can be broadly classified into three groups: **financial barriers, human factors and legislation.**

**Financial resources are generally perceived as a significant barrier to faster advancement of digitalization in all aspects - from infrastructure, upgrading software solutions, to staffing issues, whether it be hiring of IT professionals or training employees that are supposed to implement those solutions.** Representatives of the state institutions we spoke with see financial resources as a major barrier to faster development of public administration digitalisation, including the improvement of e-services for physical persons and legal entities.

**As in the case of digitalisation of the economy as a whole, the problem of the human factor can primarily be seen in the lack of IT professionals and insufficient training of employees.** Both problems are directly related to the problem of securing financial resources. According to the representatives of the ministries we spoke with, trainings for employees are expensive and IT professionals are not motivated to work in public administration under much worse terms than in the private sector.

**When it comes to public administration employees, an additional problem is the resistance to accepting the new system of functioning of public administration.** In addition to the resistance that exists among employees as providers of these services, resistance to adoption of a new system of services also exists among users of these services. On the one hand, service providers see the demands of the new system as an additional burden, because at the current stage of e-Government functioning, a large part of services are still provided at the counters. On the other hand, users are reluctant to embrace the new system of services, distrustful and insufficiently informed about the opportunities offered by e-Government, and the widespread use is further hampered by the low level of digital literacy. **There are opinions that the problem of resistance among public administration employees is wider and more complex, and above all social in nature, because digitalisation implies loss of a large number of public administration jobs.**

**Finally, legislation is cited as a significant obstacle to improving the functioning of e-Government. Interlocutors agree that the Law on Electronic Government, which includes regulations related to electronic seal, electronic signature and electronic delivery, as well as the adoption of secondary legislation, will significantly improve the functioning of e-Government.**

## The role of ICT sector in economic development - potential and current impact of ICT on the economy

**Most representatives of the IT sector in Montenegro and in the three countries of the region (Serbia, Croatia and Macedonia) consider that the current situation in the ICT sector, as a separate industry, is better than the situation in the overall economy of these countries.** Such a positive perception of the situation in the ICT sector in relation to the economy as a whole further shapes the dominant view of the IT sector representatives that the ICT industry can contribute to the country's economic growth to a considerable extent. Namely, **representatives of the IT sector in Montenegro and the region are of the opinion that the ICT sector has the potential to stimulate development of the overall economy more than any other branch of the economy. ICT sector is recognized in all countries as an important driver of sustainable economic growth and development. It contributes to enhancing the competitiveness and productivity of all other entities in the economy and thus to the growth of the overall economy.** Some interlocutors also represented a somewhat stronger view that in the **modern economy, digitalization is no longer an option and a market advantage, but a precondition for future survival in the market.**

On the other hand, the **views of citizens and businessmen are divided when it comes to the importance of the ICT sector for the development of the overall Montenegrin economy.** It is interesting that just over half of the representatives of the business sector and two fifths of the citizens believe that it would be more beneficial for the Montenegrin economy to invest in other branches of economy that have more potential than the ICT sector. They also find that investing in the ICT sector is an unnecessary waste of resources that could be channelled into more promising industries such as tourism.

**When it comes to the specific development opportunities that the ICT sector offers in the countries of the region, most IT sector representatives believe that a positive impact on the economic growth can be realized thanks to the large export potential of this industry.** IT as a predominantly service-oriented activity does not require large initial investments and resources. In addition to that, the products and services it offers are easier to export because there is a huge demand in the global market, barriers to exporting it are lower than in other industries, and thus access to the foreign market is easier. Finally, given that human capital is the most important resource on which this sector rests, the advantage of countries of the region is that they have high-quality ICT personnel whose cost of labour is significantly lower than in developed countries.

**It is stated that precisely the possibility of export and cooperation with foreign clients reduces the dependence of the IT sector on adverse economic conditions in the countries of the region.** However, a significant number of interlocutors from the IT sector in the region believe that the current economic situation in all countries in the region is a limiting factor and even has a negative impact on the development of the ICT sector, which is in **fact the biggest problem for local companies, which are predominantly focused on the domestic market**.

**Interestingly, some IT companies in the region see the advantage of developing countries, including countries from this region, in that the digitalization opportunities offered by the ICT sector are not sufficiently exploited, therefore there is currently more room for upgrading existing systems than in economically developed countries. Thus, the effects that these changes can have on the economies of countries in the region are greater.** In this context, it is argued that the immaturity of the domestic user market and low degree of dependence of SMEs on information technologies should be seen as an opportunity for companies in this IT sector, not an obstacle.

**General characteristics of the economic environment and the development of branches of economy determine both the character and the development of the ICT sector in Montenegro**. Interlocutors from the IT sector, academia and business associations believe that **the Montenegrin IT market is**

**dominated by small, local privately-owned companies, which are predominantly oriented towards the domestic market and find their clients mainly in the public sector or in more developed industries - the sales and services sector.**

Although it is stated that IT as an industry is not sufficiently developed in Montenegro, the **majority of representatives of the Montenegrin IT sector, academia and public administration consider that the positive changes are evident.** Usually referred as the main advancement **is the emergence of successful domestic software development firms that increasingly cooperate with foreign or regional clients.** In addition, representatives of IT companies and academia cite examples of foreign IT companies showing increasing interest in Montenegro.

Also, representatives of the academia and IT sector in Montenegro state that **some positive steps** have been **made in creating an environment that encourages start-up and innovative entrepreneurship**, but mainly through **private sector initiatives**. However, the interlocutors generally believe that the existing potentials are underutilized, i.e. that there should be more such success stories.

## Current Situation of the IT Sector in Montenegro and Three Countries of the Region (Croatia, Macedonia and Serbia)

Regarding the **development of the IT sector in the countries of the region** (Montenegro, Croatia, Serbia and Macedonia), **there is a high level of correspondence between the views of the representatives of the IT sector from those countries**. Most consider that the **Croatian IT sector is currently the most competitive at the regional level,** while the situation in the IT sector in Montenegro is perceived **as generally poor and worse compared to the situation in the IT sectors in other countries.** The **views of representatives of the Montenegrin IT sector largely coincide with the views of representatives of the IT sectors from the countries of the region**. First of all, it is stated that the Montenegrin IT sector is currently **in a slightly worse position than the IT sectors in Croatia and Serbia,** because the total profit generated within this sector, its annual growth and contribution to the economy is lower than in Croatia and Serbia. Additionally, most representatives of the Montenegrin IT sector agree **that the situation in the Montenegrin and Macedonian IT sectors is similar.**

**In the answers given by some representatives of the Montenegrin IT sector, faculties and business associations, the following indicators of the poorer situation of the IT sector in Montenegro compared to Serbia and Croatia were highlighted: smaller number of employees in the IT industry and IT professionals relative to the population; lower pay for IT professionals; fewer domestic software product-oriented companies and fewer software-exporting companies; smaller number of foreign companies opening software development companies and information systems development companies; the lowest variety of technologies and software tools that IT firms deal with / offer, as well as the absence of innovative technologies; underdevelopment of start-ups and fewer start-ups and innovative companies established; reduced availability of various resources such as hubs, accelerators and various forms of support for alternative forms of business in this area (”start-ups", “freelancing").**

When it comes to the **reasons why the IT industry in Montenegro is lagging behind countries in the region,** representatives of the Montenegrin IT sector underlined the following as the most important:

1. **The size of the Montenegrin market**, **as well as a number of other factors that are more or less related to this.** All representatives of the Montenegrin IT sector state that the problem is that Montenegro, being the country with the smallest population in the region, has a relatively small market compared to Croatia and Serbia. This aspect makes Montenegro less attractive to foreign investors, but also to some extent limits the development of domestic IT firms.

2. **Market structure.** Companies in the IT sector in Montenegro **traditionally market the majority of their services and products on the national market, where the state is the biggest client, while the smaller part is made of users from the real sector**.

3. **The level of government investments in the IT sector is among the lowest in the region, and far below the EU average**. Funds allocated from the state budget of Montenegro are insufficient to stimulate research and development in this area.

In addition to the aforementioned reasons, the following are also mentioned: **lower level of digitalization of the economy and a small number of domestic entities in the business sector that are able to allocate funds for the development and implementation of IT solutions; inadequacy and obsolescence of educational programs**, as well as **insufficient training of staff that have graduated from ICT faculties**; **insufficient networking of businessmen in the IT sector; absence of elaborated strategies and state incentive policies aimed at the development of this sector.**

Like the representatives of the IT sector in Montenegro, the majority of IT sector representatives in the countries surveyed stated that the main factor limiting the development of the Montenegrin IT sector is the **size of its market**. Some of the representatives of the IT sector in Serbia stated that **the size of the market is in fact the only significant factor** by which the IT sector in Montenegro differs from the one in Serbia. However, the size of the market is further determined by a number of other differences between the IT sectors in these two countries, such as the availability of large IT projects and the level of digitalisation of the systems in individual sectors. In addition to the size of the market, representatives of the IT sector in other countries cite the **general level of economic development** as an obstacle, which means that **public and private sector investment in ICT is low, especially compared to Croatia**.

## Incentives and barriers to IT sector development in Montenegro and countries of the region

**According to the statements of the representatives of the Montenegrin IT sector, currently the biggest incentives for the development of the IT sector in Montenegro are:**

1. **Quality workforce;**
2. **Initiatives initiated by businessmen;**
3. **Ability to market products and services on foreign markets;**
4. **Infrastructure development and**
5. **Lower operating costs compared to developed countries**

**Based on the responses of the representatives of the Montenegrin IT sector, two groups of factors are that currently slowing down further development of the IT sector in Montenegro the most were identified:**

(1) **Broad economic situation** – general economic development, market size and existing government investments in IT development.

(2) **ICT human resources –** their education, quality, the number of available IT professionals in the market, as well as the cost of professional work.

In addition to these two basic problems, unfavourable economic situation and inadequacy of the education system, the interlocutors often cite a **number of specific problems that rather slow down the development of the IT sector in Montenegro**, with most of them stemming from the **inadequacy of the existing legislation and lack of organization in the businesses sector. Furthermore, it is stated that the current business environment does not sufficiently support start-up businesses in the IT sector and makes it difficult for them to function in the early stages.**

The results of the assessments of IT sector representatives on the impact of **certain aspects of the business environment,** i.e. **the extent to which aspects of the business environment currently hinder the development of** this sector, show a similar pattern of responses, **confirming what IT sector**

**representatives spontaneously cited as problems of faster development of this sector in their respective countries.**

**According to the average estimates of the representatives of the Montenegrin IT sector, 7 out of the 12 offered aspects of the business environment at the moment are somewhat or very much hindering the development of the IT sector in Montenegro**. The main problems are the **existing level of financial investments in the IT sector and the incentives of the state for IT development**, as well as **aspects concerning the existing number of ICT human resources and the quality of educational programs that produce ICT professionals**. In addition, representatives of the IT sector perceive that the general economic situation in the country, the quality of available ICT human resources, the orderliness of business environment and legislation, as well as the existing criteria for granting state subsidies also pose a considerable problem. The volume of administrative procedures, the level of technological and telecommunication infrastructure development, the orderliness of business, legislation and the cost of work of ICT professionals have not been observed as major obstacles to the development of the sector.

## Trends and business models in the IT sector in Montenegro and the region

**Most of the representatives of the IT sector in Montenegro and the countries of the region included in this survey consider that the perspective of the IT sector in their respective countries for the next year is generally good.** Such predictions are based on **global market trends** (high demand for this type of services and products), but also **on local opportunities such as the increasing orientation on export among domestic IT companies and positioning in foreign markets**.

Generally, most IT sector representatives in the countries surveyed believe that **software development** has the greatest potential for growth in their respective countries**.** The reasons for this are multiple, first of all because this area **is currently the most profitable**, given the investments needed to start a business. **As a result, hardware is considered less suitable because it requires a large initial investment in infrastructure and manufacturing itself.** Representatives of the IT sector from different countries are of the opinion that it is most promising to develop **software specialized in different branches of the economy and adapted to foreign markets.**

Some representatives of the IT sector in Montenegro and the region believe that one **needs to start immediately from the needs of the foreign market** and develop business information systems and software for different branches of production. On the other hand, most representatives of the IT sector in Montenegro believe that it is most promising to move beyond the **needs of the domestic market and to more closely connect the IT sector with the more developed branches of the economy in Montenegro (tourism, agriculture, etc.).** Although it is good practice to start with the specific problems that the domestic sectors are facing, **relatively universal solutions that would be usable in the global market** need **to be developed**, because growth is only achievable through entry into the foreign markets.

Within the software industry, there is usually a distinction made between two basic business models - **outsourcing,** which involves **service-based software production at the client's request,** as opposed to **developing and marketing own solutions and products**. Among the IT sector representatives in Montenegro and the countries of the region, outsourcing is perceived as the lowest step of the ladder in the development of the software industry, while more advanced steps necessarily imply the development of own products and new technologies. Thus, representatives of the Montenegrin IT sector state that outsourcing, which is still in its infancy in Montenegro, is one of the initial stages that the domestic IT sector should go through in its development.

**Most representatives of the IT sector in Montenegro and the three countries of the region consider that** outsourcing **currently has the greatest potential for development, given the overall economic**

**environment, characteristics and maturity level of the IT sector in their respective countries.** On the other hand, representatives of the IT sector estimate that a small number of IT companies in the countries of the region are developing their own solutions, while those that have achieved significant success in the global market by placing their own genuine products are still very rare. Also, **representatives of the regional IT sector generally doubt that in the countries of the region there is currently capacity for development** of genuine IT products that would be able to compete in the global market. Most interlocutors see the main reasons for this in the lack of investments, the size of the domestic market and the inaccessibility of the foreign markets, while some cited factors such as the lack of entrepreneurial spirit.

On the other hand, the representatives of the IT sector in the countries surveyed generally show a high level of agreement when it comes to the **factors that currently favour the development of outsourcing (and the so called nearshoring) in the region:**

- **IT human resource shortage and high demand for this type of services at the global market;**
- **Competitiveness of the countries of the region**, which is reflected in the supply of **highly qualified professionals whose labour cost is among the lowest in Europe;**
- **Average quality of products and services delivered by domestic staff is often much better** than in other developing countries, where labour costs are the same or even lower;
- **Linguistic and cultural differences in relation to clients from Western European countries are lesser, thanks to a high level of English language skills and a similar business culture;**
- **Favourable geographical location and absence of time zone differences in regard to the countries of Western Europe.**

Although most IT sector representatives in the region consider outsourcing to be the most represented and the most promising form of business within the IT sector at present, **opinions are divided as to which model is preferable in terms of achieving long-term growth for the overall economy.**

**In addition to the factors that favour development of outsourcing in the region, both positive and negative aspects have been identified,** of both outsourcing and models based on developing own solutions (Table 1).

**That being said, a plausible solution, resorted to by companies that have not yet reached the level of development of their own products or who want to secure more stable sources of financing, is in one of the combined business models.**

**Table 1: Advantages and disadvantages of two business models in the software industry**

| | OUTSOURCING | DEVELOPMENT OF OWN SOLUTIONS / PRODUCTS |
|---|---|---|
| ADVANTAGES | • A growing segment of the IT market that generates significant revenue in the countries of the region<br>Contributes to increased employment and income growth of domestic IT professionals<br>• A relatively stable source of revenue and growth opportunity for domestic IT firms<br>• Encourages knowledge sharing and development of expertise, establishment of a network of associates and clients<br>• A prerequisite for the development of more advanced types of doing business - a way to gain funding and expertise in an area<br>• Less risky because it allows you to raise capital with very little initial investment. | • If the product is successful, it will generate significantly higher profits<br>• Produces added value<br>• In the long run, it has a greater effect on the economy of the entire country |
| DISADVANTAGES | • Although it may seem as a less risky business model, it does not necessarily produce reliable and stable results - there is a risk of foreign companies pulling out and going to markets that offer them better conditions<br>• The effects of outsourcing on development of economy are only indirect - sustainable economic growth can only be achieved through the development of own IT products<br>• The countries of the region are unattractive to large foreign outsourcing companies due to the low number of human resources | • Absence of disruptive innovation-oriented business models, instead of being solely focused on advancing existing solutions<br>• There are no capacities for development of genuine IT products that would be able to compete in the global market.<br>• The business model of manufacturing ready-made solutions requires significant financial resources and initial investments and carries greater uncertainty |

## Assessment of the business environment in Montenegro and measures for attracting international IT companies

Based on the response of the representatives of the Montenegrin IT sector and the academia, it can be concluded that **Montenegro is generally attractive to foreign IT companies, primarily because of lower**

**operating costs - lower labour costs of Montenegrin IT professionals and more favourable tax rates compared to their countries of origin.** However, representatives of the IT sector and business associations believe that the **Montenegrin IT sector is currently not sufficiently developed to attract potential investors**. For example, a representative of an association of businessmen points out that one of the main barriers when it comes to attracting foreign IT companies is the **lack of studies that would provide a quality overview of the market situation. Namely, for investors to consider expanding into the Montenegrin market, they must have good insight into its current state**, which is not currently possible, as there are no official statistics on this sector. In addition, it is pointed out that there are other **significant obstacles to attracting foreign investors,** which are primarily reflected in an **insufficiently defined legal framework** (e.g. **defining ownership, regulating digital signatures, availability of basic online payment services), but also frequent legislative changes that affect business predictability.**

When it comes to **state initiatives to incentivise the entry of foreign companies, in the form of granting various tax breaks and subsidies, representatives of the IT sector and IT faculties in Montenegro primarily cite the negative effects such measures would have, such as taking over employees from domestic companies.** One potential profit is that foreign companies contribute to the development of the staff they employ. These professionals may subsequently be hired by domestic firms or they may open their own businesses, which would generally contribute to the development of HR competencies in the IT sector.

## Start-up scene in Montenegro

Representatives of **Montenegrin start-ups and foreign-oriented IT companies see Montenegro's greatest development opportunity in building a start-up ecosystem that would have great potential for start-up development at the regional level.** However, according to the interlocutors' assessment, **Montenegro has not yet built a supportive business environment that would ensure the development of success stories in this area.** Representatives of the academia and IT sector believe that the **development of the start-up scene in Montenegro is still largely happening within the private sector – the IT community and with the help of resources provided by other companies.**

Based on the responses of representatives of Montenegrin start-ups and IT companies familiar with the start-up business, several **major problems for the development of this business model in Montenegro** have been identified**.**

The key ones are:

**(1) Insufficient knowledge of the specificities of this type of activity among decision makers and creators of state support measures, which means that existing investments and state support measures are not necessarily intended for start-ups specifically or are not sufficient to support the development of start-ups.**

(2) **start-ups in Montenegro lack two basic forms of support - in addition to financial support, mentoring support is also needed, in order to minimize risks and increase the chances of success of this type of business. There are credit lines, but they are not tailored to the needs of start-ups; while basic start-up subsidies do not provide for the necessary co-working spaces**.

In addition to these two major issues, representatives of start-ups in Montenegro also cite **technical obstacles** that affect the **conditions of opening a business in Montenegro and further complicate the functioning of start-ups in the early stages**. (4) Finally, **the aforementioned inability to carry out various financial transactions in Montenegro is another aggravating circumstance for start-ups.**

## Quality of educational programs

**It** will be necessary to develop **digital competences for all students,** in order to prepare them for the future demands of the labour market and function better in the modern society. **Surveys conducted as part of this study indicate that existing school curricula in general, as well as ICT education programs in Montenegro, do not follow sufficiently the development of ICTs. Significant problems have been identified at all levels of education, and most interlocutors from the IT sector and faculties at which IT professionals in Montenegro are educated believe that changes are necessary already at the level of primary and secondary education. Also, as many as 81% of citizens think that it is necessary to reform the educational system in Montenegro in line with the development of ICT**, both in terms of using ICT in acquiring knowledge and in training students to acquire skills for their use.

**Citizens predominantly believe that Montenegrin schools in general do not provide sufficient knowledge and skills that correspond to the needs of contemporary living and working conditions**. Every other citizen of Montenegro between the ages of 18 and 65 thinks that **schools in Montenegro mainly follow the development of ICT, but not enough, while as** many as one quarter point out that schools in Montenegro are lagging behind in the development of ICT.

Interlocutors from the IT sector say that the educational system as a whole is not agile enough - the **procedures for defining the curriculums, as well as the accreditation process, are too slow to respond to the demands of modern society and the economy.**

Regarding primary and secondary education in Montenegro, **three basic groups of problems have been identified**, based on the responses of representatives of the IT sector, business associations, faculties at which IT staff is being educated and the Ministry of Education **: (1) insufficient integration of information and communication technologies in the teaching process; (2) insufficient representation of IT courses; as well as the problem that partly underlies the first two problems and relates to (3) the reduced HR capacities of schools - the lack of education of teaching staff regarding ICT and the lack of IT staff in education.**

The interlocutors also recognized certain **positive measures undertaken by the state, but also by the academia and businessmen from the IT sector, with the aim of improving the educational practice in primary and secondary schools**. First of all, they mention **(1) training programs for teaching staff in schools** and **(2) computer programming schools for elementary and high school students created** in cooperation with professors from the University of Montenegro and representatives of several IT companies.

**Regarding formal secondary and university education in the field of ICT, representatives of the IT sector point out that the low quality of educational programs that produce ICT staff is one of the key obstacles to further development of this sector**. Also, education is the area that is most often linked to the measures that the state needs to implement in order to improve the IT sector. According to the IT sector representatives' statements, the biggest problem is that **the educational system in Montenegro is currently producing IT staff whose knowledge must be significantly enhanced after they enter the labour market**.

Interlocutors from ICT faculties, as well as one representative of business associations and several representatives of the IT sector in Montenegro **recognized the need to receive training as early as possible, in order to be able to work in the IT sector already after high school.** That being said, it is especially **important that there are adequate education profiles at the secondary school level that would provide ready-made personnel prepared to enter the labour market**. **Secondary education should also provide a good enough basis for those students who will opt for further education in ICT studies**.

Only 13% of citizens think that faculty programs in the field of ICT provide all the necessary knowledge and skills in line with the development of ICT, while half of them say that the faculties mostly follow the development of ICT, but do not sufficiently provide the knowledge required in the contemporary labour

market (Graph C1 .3). In addition, close to one fifth (19%) point out that faculties are lagging far behind in this regard. Citizens' opinions are in line with the opinions of businessmen. Specifically, three out of five (60%) representatives of the business sector in Montenegro believe that education programs in the field of ICT are largely or completely out of alignment with market needs. Representatives of the IT sector say that the current model of higher education does not produce quality IT experts.

**(1)** First of all, there is the **problem of the applicability and functionality of the knowledge gained at the faculties,** which is a consequence of cumbersome and outdated study programs laden with unnecessary content and theory, which does not teach the new technologies needed in the labour market. In this context, the current educational programs do not produce all the IT profiles for which there is a demand in the IT sector and certain study programs in the field of IT are unavailable in Montenegro. **The obsolescence of study programs and the inapplicability of acquired knowledge in the labour market is partly due to (a) the problem of lack of professional IT staff at faculties,** which, as mentioned, also exists at lower levels of education, and partly due to **(b) the rapid development of ICT and the changing market trends, that the curricula at the faculties cannot keep up with.**

**(2) In relation to the aforementioned, practical knowledge is often lacking, and formal education does not sufficiently encourage the development of entrepreneurial spirit and (inter)personal skills (the so called soft skills) among students – time management, communication with the client, teamwork, but also responsibility and accountability in the work.**

These problems require further education of newly graduated academics and finding alternative avenues for acquiring the necessary knowledge and skills**. Thus, non-formal and informal education, which are mainly focused on acquiring practical knowledge and skills, become an indispensable part in the process of creation of quality IT staff.**
From the perspective of the IT sector representatives, in order to overcome the aforementioned shortcomings, it will be necessary to **(1) connect and establish cooperation between the University and the business sector, as well as (2) to network employers in the IT sector.** A stronger link between the university and the economy could contribute to improving educational programs, but it would also support entrepreneurship as an integral part of education and encourage the development of innovations in the IT sector, while networking employers in the IT industry would help create resource centres to facilitate students' specialization and transition to the labour market.

**Representatives of the IT sector in Montenegro believe that there is currently no effective dialogue between educational institutions and business representatives**. As it was stated, although there are some forms of cooperation, such as traineeships, they are mostly informal and most initiatives are initiated by the businessmen from this sector.

Since a significant part of the education of personnel is taken over by employers in the IT sector, the need for formal establishment of **cooperation between companies** was recognized **- in this way the resource centres would be formed,** i.e. any employer would be able to offer training for those technologies for which he has a team of trained professionals. However, as stated, **currently the cooperation is only partial, i.e. systematic approach and planning are lacking, and it is usually organized informally, based on personal acquaintances.**

**According to the interlocutors from educational institutions and business associations, alignment with the needs of the labour market is, to a certain extent, implemented through joint initiatives of educational institutions and business representatives. Here are two examples of collaboration that have contributed to improving the quality of education for the IT profession**s: (1) **introduction of new educational IT profiles in vocational secondary schools** , i.e. occupational standards **(computer software technicians and computer network technicians**) have been defined, which in the future

should result in production of specific human resources immediately after high school and which respond to specific market needs; and **(2) the introduction of compulsory practical training** and the drafting of the *Agreement on the Implementation of Practical Trainings Outside the University of Montenegro,* which lays down a formal basis for the organization of traineeships with employers.
In addition to that, as one example of the **positive changes at the level of secondary vocational education, the representatives of the faculties at which ICT staff is being educated cite the renewal of the departments of mathematics in lyceums, which were extinguished more than ten years ago**.
In addition, a significant change at the level of the University of Montenegro is the transition to the new three-stage model of studies, which uses the 3 + 2 + 3 system (bachelor, master, PhD) instead of the previous 3 + 1 + 1 model. Thus, a completely different perception of master studies was created, which became more prevalent and gained more prominence in shaping future staff.

## Labour market

**The need for IT staff globally is growing faster than the number of IT professionals, so companies in this sector are facing a labour shortage problem. Consequences of this global trend are beginning to be felt in Montenegro.** Thus, representatives of IT companies point out that finding appropriate staff is becoming more and more of a challenge, and it is anticipated that this will become an even greater problem in the future. **According to one representative of an IT company, the enrolment quotas at the faculties where IT staff is being educated do not currently present a problem, although there is room for increasing the numbers in this segment as well. A bigger problem is actually the low efficiency of studies, which is reflected in students dropping out from their faculties.**

**Interestingly, close to a third of citizens between the ages of 18 and 35 are interested in working in the field of ICT development and provision of ICT services** - while 11% consider themselves already sufficiently qualified for jobs in this area, 19% say that they would be willing to attend vocational trainings. In addition, 2% are already working and 1% are planning to start their own ICT business. However, over half (53%) of citizens between the ages of 18 and 35 are not at all interested in developing ICT and ICT services.

When it comes to the impact of information technology development on the field of work, interlocutors from the IT sector, education and government institutions find it difficult to make predictions in regard to the IT field. **Representatives of educational institutions and the IT sector expect, above all, a positive impact of information and communication technologies, while one interlocutor from the Employment Agency of Montenegro recognizes that some professions will disappear almost completely, but he does not know with certainty in which areas this could be particularly pronounced**.

**However, most interlocutors say that the use of new technologies will also affect the creation of new industries, new jobs and the need for staff with different knowledge and skills than what is the case today**. Interlocutors from the IT sector, academia, business associations and state institutions **identified two key obstacles that affect the lack of preparedness of citizens and the state for the changes that new technologies inevitably bring to the labour market.** (1) First, there **seems to be resistance to new technologies among citizens, stemming from fears that increasing automation will lead to job losses and creation of surplus of workforce.** (2) The **need for adaptation, long-term planning and directing the workforce towards adopting new, advanced skills needed for the professions of the future is not recognized at the national level. It is worrying that comprehensive analyses of the effect of use of new technologies on the labour market in Montenegro are still lacking.**

More than half (55%) of 18 to 65 year-olds believe that the accelerated development of technology will inevitably lead to robots and computers replacing humans in many professions, resulting in the creation of redundant workforce – while a third believe that this will not happen in the near future, a quarter

state that this is already beginning to be felt. On the other hand, 29% of citizens believe that robots will never be able to replace humans. About one-fifth of citizens say that robots can completely or fairly well replace humans in their professions. On the other hand, as many as two-thirds of citizens believe that robots cannot, or can only to some extent replace people in their professions. It is interesting that among the citizens with primary education there is a greater belief that robots cannot replace humans in their profession at all.

**Businessmen are slightly more convinced that computers and robots will replace humans in many professions - 44% do not believe this will happen in the near future, while 16% think the consequences are already noticeable.** Yet two-fifths of businessmen say robots will never be able to replace humans. A small percentage of businessmen believe that the increasing automation and use of ICT will affect the change in staffing needs in their businesses, whether by reducing the need for some profiles or increasing the need for others. Only 4 out of 32 representatives of companies (13%) believe that over the next five to ten years the increasing automation and use of ICT will reduce the need for certain staff that their company currently employs. **Businesses that expect a reduction in the need for some staff cite accounting and administrative services, and businesses that expect a rise in the need for new staff cite ICT professionals who will create and maintain specific programs required for the operations of companies**.

## The role of the state

Representatives of institutions as well as representatives of IT companies in Montenegro agree in principle on what role the state should play in the development of the IT sector, and it is first reflected in:

1. **Engagement in the field of legislation regarding IT sector;**
2. **Defining concrete, first and foremost financial support measures for IT companies;**
3. **Pointing out the importance of the ICT sector to the overall economy of Montenegro and its citizens;**
4. **Initiating systemic change in different spheres, with an emphasis on the education sector, which in the long run is driving the growth of the IT sector.**

Representatives of the IT sector and business associations believe that the state does not have a systematic approach and planning, and one of the basic things that is missing is the lack of vision and formal recognition of the potential of the IT sector. In addition to the fact that with the abolition of the Ministry of Information Society and Communications the IT sector lost basic visibility in general public and is therefore not recognized as a sector worth investing in, there is still the issue in what form is the government currently monitoring and planning the development of the IT sector.

At a more concrete level, **basic mechanisms such as the use of digital signatures (1), the availability of payment systems such as PayPal (2), and the establishment of cooperation with the world-renowned banks (3) are currently lacking** in the provision of technical conditions. What is also mentioned is the **regulation of public procurements (4) and the signing of bilateral agreements aimed at regulating double taxation (5)**. Overall, **legislation needs to be amended, so that it complies with the European standards** and makes it easier for businesses to operate.

Amendments to specific laws additionally cited by the representatives of institutions in Montenegro, concerning the IT sector and digitalization of the economy in general, refer to: (1) The Law on Electronic Governance; (2) the Law on Electronic Identification and Electronic Signature; (3) the Law on Value Added Tax; (4) Cybersecurity; (5) Regulation of the status of “freelancers” (persons who work for a particular company, but are not employed by that company); (6) Personal Data Protection Law and the

General Data Protection Regulation (GDPR).

## IT sector in Montenegro - analysis of current strengths and weaknesses, as well as potentials and possible dangers to further development

Based on the results of the research conducted within this project, the strengths and weaknesses, as well as the potentials and possible threats to further development of the ICT sector and for the development of the digital society in Montenegro were identified.

### STRENGTHS

- Montenegro's advantage is its ability to quickly implement reforms in all socio-economic fields, including the ICT sector, as it is a territorially small country.
- Geographical proximity, absence of time zone differences, cultural closeness, good English language skills, as well as lower labour costs and ease of separate collaborative work make Montenegrin IT staff and businesses attractive to Western European clients. This way of working facilitates connectivity and increases team productivity by providing easier access to co-workers, documents and information needed to make decisions and get the job done. Groups are able to cooperate more efficiently and to quickly configure locations and workspaces.
- Proximity to the regional market united by the same language.
- Low operating costs compared to developed countries and low corporate rates - corporate income tax, just 9%, which is among the lowest in the region.
- The low cost of living makes it much easier for individuals to start a business on their own (”bootstraping”), as well as functioning of start-ups after the initial investment
- Montenegro has a relatively large number of successful IT firms in proportion to its population and a rapidly growing market.
- General IT development - the number of services available is increasing.
- The ability to turn to the global market - no physical presence required, increasing presence of outsourcing and freelancing
- The emergence of successful domestic software development firms that are increasingly collaborating with foreign clients or clients from the region.
- Supporting IT community, and available resources, such as Digitalizuj.me, M:tel Digital Factory and others. Informal networking of professionals, conferences, gatherings (Spark.me), hackathons. Ability to further customize existing resources (Tehnopolis).
- Initial steps were made in building a start-up scene.
- Developed and quality infrastructure.
- Human capital and education: staff with general education that can be tailored to the specific market needs.

### WEAKNESSES

- Market size and structure: market is dominated by small IT firms that are oriented towards the domestic market where the largest client is the state. As a result, the IT sector is too dependent on adverse economic conditions in the country.
- Few IT companies that are oriented on software production and export.
- Unadapted educational system that fails to teach general programming literacy in primary and secondary schools.
- The university education system is changing too slowly to fully respond to the changing demands of the industry.

- Those who complete their studies in the field of ICT usually get an education that is too broad, but with not enough of practical experience.
- Also, the lack of a critical mass of ICT professionals from a large number of narrowly profiled professions.
- Lack of staff in interdisciplinary fields (law, economics, marketing, sales)
- Lack of digital skills of employees, i.e. digital literacy in the labour market in general.
- Insufficient awareness of society about the need, importance and possibilities of digitalisation. In principle, the importance of digitalisation for the growth of the economy is recognized by the citizens of Montenegro, but a small percentage of them show any interest in improving their own digital skills.
- Businessmen lack of awareness of the importance of digitalization - there is still no full understanding of the gains that digitalization brings.
- In large number of primarily small businesses, investments in information and communication technologies are still seen as an additional cost, rather than an investment to improve the business. There is no understanding of the need to introduce IT solutions and the benefits they can bring.
- e-Government is somewhat developed, but is incomplete and lacks support systems for certain services. There is a great disparity in the quality of e-services, which varies from administration to administration. It also lacks a centralized, unified information exchange system.
- There is a lack of coherence between government and the private sector, so the participation of the private sector in decision-making processes regarding digitalisation is significantly reduced.
- Obstacle to greater digitalization of the economy and problems related to legislation. The importance of legislation on digital signatures and the inadequacy of the solutions currently offered by the certification authority are particularly emphasized.
- General lack of understanding of the Law on Digital Signature among businessmen.
- Lack of harmonization of the laws, which results in services such as PayPal being still unavailable, significantly impedes the development of start-ups and damages the digitalisation and competitiveness of non-ICT related offerings (renting out private accommodation, export, online sale of services). Alternative electronic payment systems are unavailable.
- Lack of objective data and clearly defined objectives to properly measure the development and effectiveness of the measures taken.
- Expensive enterprise internet infrastructures and maladjusted laws make it difficult to provide services online
- Insufficient number of foreign investments.
- Absence of innovative technologies and a variety of technologies and software tools that IT companies deal with / offer.
- Less availability of various resources such as hubs, co-working spaces, accelerators and various forms of support for alternative forms of doing business in this area (start-ups, freelancing). In particular, there is a lack of mentoring for start-up development ("smart money").
- Existing measures like Tehnopolis or credit lines are not adequately designed for start-ups.
- There are no incentives for the development of entrepreneurship (e.g. during studies)
- The ease of hiring individuals from Montenegro causes the highest quality staff to easily make the decision to leave domestic companies and start freelancing for foreign companies.
- Freelancers are not formally recognized and their work is generally not legally regulated.
- Innovation centres do not exist - i.e. academic work and the market are not connected.
- Sectoral division - there is no formal association of interest groups and planning of use and improvement of the existing resources, as well as introducing new ones.
- Separation of economy and educational institutions.
- Formal support for the sector is lacking – recognition that ICT has the potential to develop the overall economy.

## POTENTIALS

- There is a nominal desire of the state administration to listen to the advice of the businesses.
- Many legal obstacles will be overcome in the EU accession process.
- Persons who are motivated to improve their knowledge of new technologies and tools, beyond educational institutions, have the opportunity to access the world's most important educational resources through the internet, which represents a significant development potential in this field. The education system in most of Europe is not that much better than in Montenegro. A proper reform and raising computer programming literacy would make programming and hybrid programming professionals competitive outside Montenegro.
- There is the potential for outsourcing to become even more prevalent.
- Trends such as citizen mobility are driving the need for new services.
- Steps taken to network the professionals in Montenegro and in the region.
- Successful start-ups that serve as an impetus for the development of this type of business.
- European Union funds as a source of funding.

## POSSIBLE THREATS

- Montenegro, like other small countries, is dependent on trends in global change and the local practical application of existing technologies.
- If the smart specialization policy does not overcome the weaknesses mentioned above, there is a serious risk of human resources outflow, especially of the highest quality ICT personnel, which is inevitable if the domestic economy does not offer them employment and appropriate working conditions. Declarative availability, bureaucratic mentality and inertness can slow down strategic efforts to significantly improve the ICT sector and make a significant contribution to economic development.
- The nature of work in the ICT sector, especially when it comes to software companies and start-ups, makes this branch of the economy very unrewarding for planning and systematic approaches. The intangibility of the product and the relatively short existence of a large number of professions, young and non-standardized project development methodologies, along with the constant change of tools, technologies, working methods and communication in teams, make the engineering approach and planning of software product development a great challenge for domestic software companies.
- Small market will significantly hinder the development of large specialist companies with hundreds of hired developers. International clients will be naturally focused on Serbia and Croatia in search of the services of this type of companies in the region. This also makes the offer of companies from Montenegro less visible in the international market.
- Outsourcing as an unstable model of work can stagnate or decline.
- The non-export-oriented IT development perspective is largely related to Montenegro's economic progress and economic development.
- The rise of cloud services has resulted in less investments in hardware, which can present a challenge for the IT market where most businesses still rely on hardware.
- The presence of outsourcing and freelancing may in the future lead to a reduction in the number of personnel available in the labour market.

## Recommendations

**The basic task of the state is to reform the education system and provide continuous education of the people, as well as to amend legislation and numerous regulations in order to facilitate business operations as much as possible.**

**Establishment of a body that would represent the IT sector within the Government Ministries or other state bodies** - establishment of a central interdepartmental body at the Government / State level (Office, Council, etc.) would contribute to greater visibility of the sector and indicate that the state truly recognizes its economic potential.

**Promotion of the domestic information technology industry:** through networking of professionals, organized approaches to the global market and adequate monitoring of IT sector development (conducting and publishing periodic studies that track relevant indicators in the ICT sector) would help start-ups to enter foreign markets more easily and overcome difficulties in finding foreign clients.

**Stimulating outsourcing:** through the work of business associations and relevant state institutions on networking, participation in international conferences and the like.

**Stimulating the development of own solutions and products:** through systematic education of the entire population and creation of an educational system that would encourage creativity and entrepreneurship.

**Formation of sectoral business associations:** Joint approach would contribute to faster and more efficient resolution of problems that businesses in this sector are facing.

**Immaturity of the domestic user market and low degree of dependence of SMEs on information technologies should be seen as an opportunity for companies in this IT sector, not as an obstacle.**

*Recommendations for creating a supportive environment for start-ups*

**Formation of a suitable ecosystem for start-up development:** Ensure greater availability of different financing models tailored to each of the stages of business development of start-ups, through establishment of funds and education of staff in state institutions on how to apply for EU funds.

**Solving space shortages solely intended for start-ups as innovative, fast-growing technology businesses.**

**Stronger connection between start-ups and academia, as well as representatives of the economy that would facilitate development of innovation and entrepreneurship.**

**Provision of necessary resources and support measures in order to minimize risks and increase the chances of success of this type of business:** it is essential that accelerators and incubators include the possibility of mentoring support (”smart money”) and exchange of experience with other start-up entrepreneurs.

*Recommendations for advancing the digitalization of society*

**Educating employees and finding an adequate incentive models** would solve the problem of shortages of educated staff in the public sector, that threatens its further digitalisation. It is necessary to attract IT professionals, who generally prefer employment in the ICT sector, where opportunities for advancement are greater and working conditions are more favourable, rather than finding employment in the public sector. Also, it would be necessary to retain the existing staff.

**E-Government aligned with citizens' needs:** Adopting a series of conclusions and guidelines for quality application of ICT in the society in line with the findings on citizens' digital skills and their willingness to use ICT, especially given the "vulnerable groups", which are more affected by digital inequality.

**Informing citizens and businesses about the importance and benefits of using e-services.**

**Informing businessmen and raising their awareness of the different opportunities that ICTs offer, as well as specific examples of how ICTs can improve their businesses** (e.g. on the benefits of using cloud platforms).

*Recommendations for the advancement of university education in the field of ICT*

**Greater collaboration between the faculties and the private sector:** Cooperation must be more systemic, rather than sporadic as it is currently the case. Instead of relying on personal acquaintances, periodic roundtables, working groups and meetings should be established to track trends, supply and demand.

**Networking of employers in the IT sector:** Networking of employers in the IT sector would help create resource centres that would facilitate specialization process for the students and their transition to the labour market. The result would be a unique pool of available staff.

**Creating unified study programs:** This would complement the competencies of staff who gain limited insight into an area that increasingly needs to be interdisciplinary. In addition to highly specialized professionals, lawyers, economists, designers and marketing managers in ICT are needed as well.