# GUIDELINES FOR SMART SPECIALISATION STRATEGY OF MONTENEGRO


## 2018-2024

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# I INTRODUCTION

By drafting the Smart Specialisation Strategy, Montenegro has joined the initiative of the European Union that focuses on the new model of economic development at the national or regional level based on targeted support to scientific research activities and innovations. Smart Specialisation Strategy (S3)[1] is, therefore, a national or regional innovation strategy setting development priorities in order to *build competitive advantage* by developing and connecting own capacities in research and innovation with the needs of the economy, while responding coherently to growing opportunities and market development, which helps to avoid duplication and fragmentation of policies[2]. As a key element of development policy, smart specialisation increases the competitiveness of the economy, by concentrating and linking research and innovation resources to a limited number of determined priority economic areas. In addition, such strategies should utilise the *competitive advantages* of a country or region to the maximum, by encouraging innovation and thus contributing to the economic growth and overall progress of the society.

The "Innovation Union" is one of the seven leading initiatives of the Europe 2020 Strategy, aiming to improve the framework conditions and access to financing of research and innovation that would stimulate economic growth and creation of new jobs.

In the European Commission document titled "National/regional innovation strategies for smart specialisation (RIS3) – Cohesion Policy 2014–2020", smart specialisation strategies are defined as integrated, place-based economic transformation agendas that do five important things:

- They focus policy support and investments on key national/regional priorities, challenges and needs for knowledge-based development;
- They build on each country/region's strengths, competitive advantages and potential for excellence;
- They support technological as well as practice-based innovation and aim to stimulate private sector investment;
- They get stakeholders fully involved and encourage innovation and experimentation;
- They are evidence-based and include sound monitoring and evaluation systems.

Through a partnership approach as well as the *bottom-up* approach, smart specialisation brings together local decision makers, academic and business community, civil society and other social actors that work on implementation of the long-term growth strategy. S3 strategy itself enables creation of synergy between the European policies and sources of financing, complementing national and regional programmes and private investments in this manner. By focusing on those matters that provide the greatest competitive potential to certain regions, smart specialisation enables them to find their place in certain global markets and in the international value chains.

Since 2011, the European Commission has been providing advice to the regional and national decision makers for establishment and implementation of their smart specialisation strategies, doing so through the "Smart Specialisation Platform" mechanism. The platform facilitates joint learning, data collection, analysis and networking opportunities for around 180 EU regions and 22 national governments.

In accordance with Regulation (EC) No 1059/2003 of the European Parliament and of the Council of 26 May 2003 on the establishment of a common classification of territorial units for statistics (NUTS), Montenegro has been defined as a single NUTS[3] region, since it covers the area

[1] Smart Specialisation Strategy (S3) or Research and Innovation Strategy for Smart Specialisation (RIS3)
[2] Regulation (EU) No 1301/2013 of the European Parliament and of the Council of 17 December 2013
[3] Nomenclature of Territorial Units for Statistics. Montenegro is defined as a single NUTS region on all three levels (NUTS 1 = NUTS 2 = NUTS 3).

of 13,812 km$^2$ with a population of 620,029 inhabitants, residing in 24 municipalities with 1,307 settlements[4]. On this basis, when it comes to developing the Smart Specialisation Strategy and knowledge-based economic development, the country is also treated as a single region, which should find its place among the total of 272 NUTS II regions within the EU-28.

Implementation of the Smart Specialisation Strategy has great strategic importance for Montenegro as it may encourage public and private investments in research, technological development and innovation. Adequate identification of S3 development priorities may enable consolidation of research capacities and infrastructure, gathering a critical mass of researchers and innovators that would work together on strategically important topics of research and development, with a view to achieving research excellence and strengthening the potential of domestic products for commercialisation. In addition, S3 may also enable the development of the new economic sectors through investments in research and innovation in areas that contain strategic potential within the national framework.

[4] According to information from 2011 census.

# II GOVERNANCE

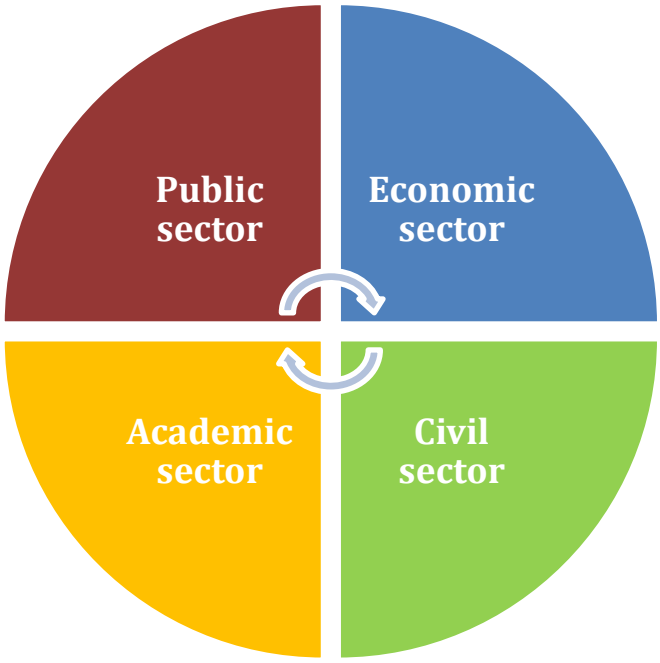
## II 1. S3 DRAFTING PROCESS

At the beginning of the new millennium, Montenegro has started to build market economy based on the rule of law and stable institutions. In addition, the *Stabilisation and Association Process* has additionally strengthened political stability and created the preconditions for increasing the economic activities. All of the above has resulted in dynamic economic growth and increasing level of competitiveness of the national economy. The Smart Specialisation Strategy should promote the above development trend further by completing the strategic commitments realised so far.

The activities on Smart Specialisation Strategy of Montenegro have started in early 2017. The Strategy is a product of a collaborative process in which different actors have been enabled to participate in each stage of preparation of the Strategy, with the process being open to all the citizens eventually through the process of public consultations.

The Ministry of Science (MoS) has coordinated the process of developing the Smart Specialisation Strategy for Montenegro with the help of the Ministry of Economy (MoE), cooperating intensively with other competent institutions from the public, business, academic and non-governmental sector under a quadruple helix governance model, with systematic assistance provided by experts of the European Commission. (Figure 1)

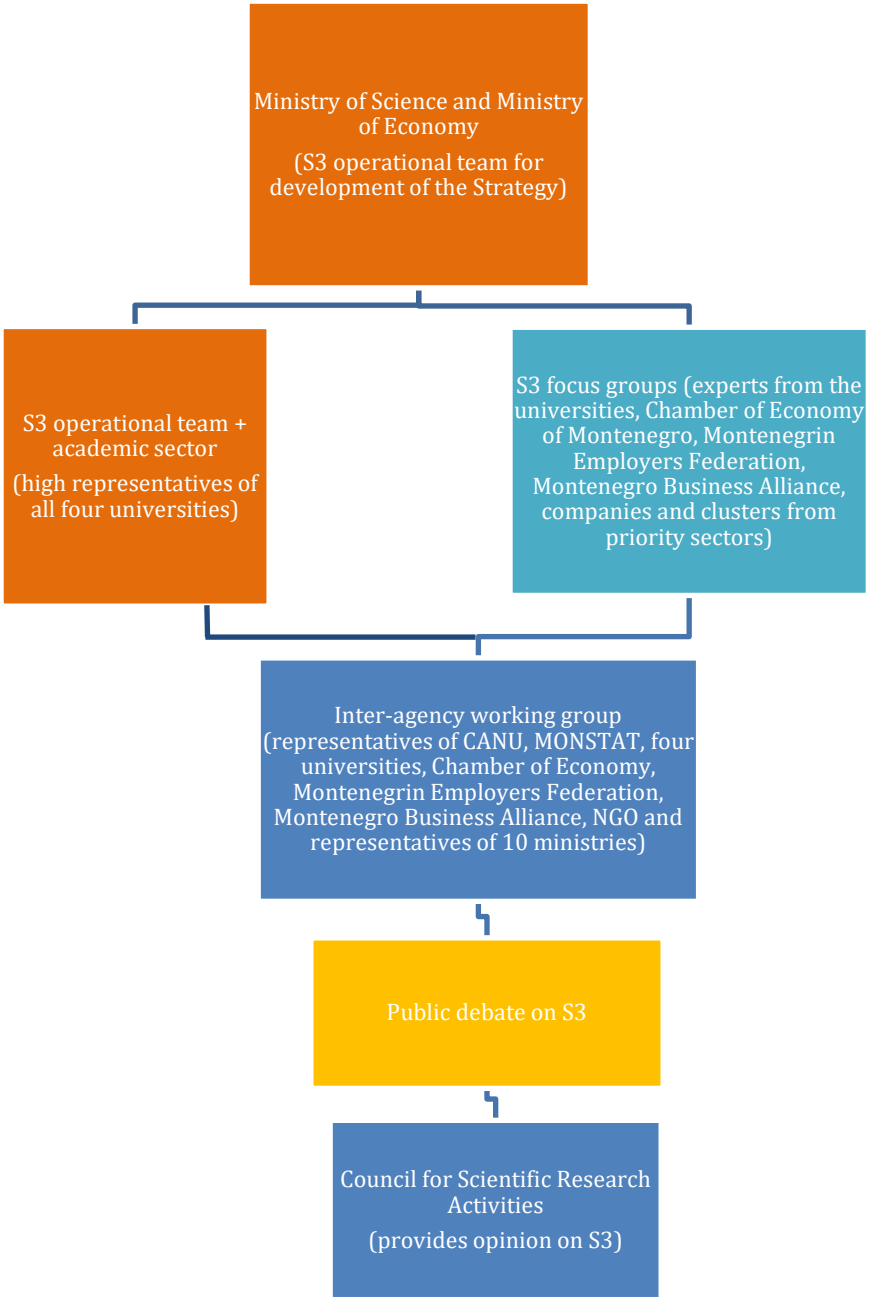
**Figure 1 – Quadruple helix governance model**




This model has enabled the Government to include all the relevant actors in creation of the Strategy while maintaining its role in organisation and management of the collaborative activities on the preparation of the Strategy. Figure 2 below shows an organisational scheme representing the framework for dialogue between the main actors in the process of drafting the S3.

The S3 operational team consists of the representatives of the Ministry of Science and the Ministry of Economy, while the expanded operational team consists of the representatives of all the universities in Montenegro. The main activities of the S3 operational team have been directed towards organisation and management of the process of preparation of the Strategy. The activities have encompassed raising the institutional capacities for preparation and implementation of S3 at the national level as well as its promotion. In addition, the S3 operational team has been responsible for communication with the Joint Research Centre (JRC)[5], as well as with external experts involved in the process of preparation of the Strategy.

**Figure 2 – Organisational chart**




[5] Joint Research Centre, one of Directorates General of the EC.

Through inclusion of the academic sector at the operational level, provisions have been made for the Strategy to focus on research and innovation, which enables a more efficient and better-quality identification of key actors for implementation of the Entrepreneurial Discovery Process and preparation of the Strategy itself.

The S3 operational team has received expert assistance from S3 focus groups, which are specialised in thematic priorities identified through the process of quantitative and qualitative analysis for the S3. These S3 focus groups have been composed of representatives of the economic, public, academic and civil sector (quadruple helix model, Figure 1) acting as a pool for gathering information and ideas through the Entrepreneurial Discovery Process – EDP.

In addition, a separate inter-agency working group has been formed from representatives of the economic, public, academic and civil sector, playing the role of managing the process of S3 preparation. This group has supervised, advised and enabled transparency of the process of Strategy preparation, encouraging collaboration and participation of different segments of society. This group has played a particularly important role in solving horizontal issues related to all thematic areas and has helped in the implementation and ensuring continuity of the Entrepreneurial Discovery Process.

One of the important steps in creating the S3, completed in March 2018, has been the process of mapping economic, innovation and scientific potential in Montenegro. A final report titled "Mapping economic, innovation and scientific potential in Montenegro" was used as a basis for creating the document titled Analysis of Priority Areas for the Smart Specialisation Strategy of Montenegro (Quantitative and Qualitative Analysis), which was a precondition for the commencement of the Entrepreneurial Discovery Process.

The EDP process has started with the organisation of the S3.me – Smart specialisation, innovations, entrepreneurship and competitiveness conference, held on 11 May 2018, which gathered around 200 participants from the economic, public, academic and civil sector. With the support of JRC experts from Slovenia, a large number of workshops has taken place per priority areas and in an interdisciplinary manner. In addition, meetings of sectoral working focus groups have been organised, where more specific areas of development within the sectors and potentials for the future development of Montenegro have been defined. At the meetings, within the determined priorities, focus areas have been identified, a vision explicitly reflecting on each sector/priority has been determined, and objectives have been set with specific indicators and measures in accordance with which the Strategy will be implemented.

All actors interested in the S3 drafting process had a chance to get involved in the EDP process by filling-out a web questionnaire, which was open from 25 June to 31 August 2018, in the joint platform of the national e-Government.

The final S3.me – Smart Specialisation, innovations, entrepreneurship and competitiveness conference was held on 18 September 2018, presenting the results of the Entrepreneurial Discovery Process. Around 150 participants from the economic, public, academic and civil sector have attended the final conference.

In the Entrepreneurial Discovery Process, nearly 300 representatives of the economic, public and academic sector have participated, more than half of which from the private sector. Through an open dialogue, the process has resulted in the identification of priorities and their synergies

based on strengths and potential for research, development and innovation, with an emphasis on practical application and market orientation.

Given that the Entrepreneurial Discovery Process is continuous, the Ministry of Science has continued the activities that support the process. Therefore, the information gathered after the final S3 conference, obtained through activities that have amended and continued the EDP, have also been used in preparation of the Strategy. These activities relate to analysis of the data collected by processing the applications to a Call of the Ministry of Science for awarding grants for innovative projects, which was published in mid-year and closed on 24 September 2018. In addition, during the "Market of perspective ideas for Montenegro" event, organised on 12 October 2018 within the traditional "Science Open Days" Festival, promising development ideas based on research and innovation have been identified.

In addition to the above, the Smart Specialisation Strategy of Montenegro has relied on state strategic documents. In the preparation of the Strategy, relevant EU documents dealing with the matter have also been consulted, and the methodology of the Joint Research Centre has been applied.

Through the use of relevant European methodology for S3 preparation, with the active participation of a large number of actors from the economic, public, academic and the civil sector, key priorities of the Strategy have been defined as follows: Sustainable Agriculture and Food Value Chain; Renewable Energy Sources and Energy Efficiency; New Materials and Sustainable Technologies; Sustainable and Health Tourism as vertical priorities, and ICT as a horizontal priority.

Before the final adoption, the Strategy has been posted on the website of the Ministry of Science for public discussion, in order for all the interested parties to have another opportunity to provide their recommendations and suggestions for improving the text of the Strategy and the relevant issues.

As a national independent consultative body, the Council for Scientific Research Activities has been informed about the progress in development and contents of the Strategy through periodical reports and presentations. At the end of the process, i.e. after the public discussion and text improvement on the basis of its recommendations, the Council for Scientific Research Activities provides its consent for the Strategy to the Ministry of Science, which then submits it to the Government of Montenegro for adoption.

After the adoption of the Smart Specialisation Strategy, all the working bodies constituted during its preparation or involved in it continue their work through periodical engagement for the purpose of monitoring the implementation of the EDP and its updating.

## II 2. GOVERNING STRUCTURE

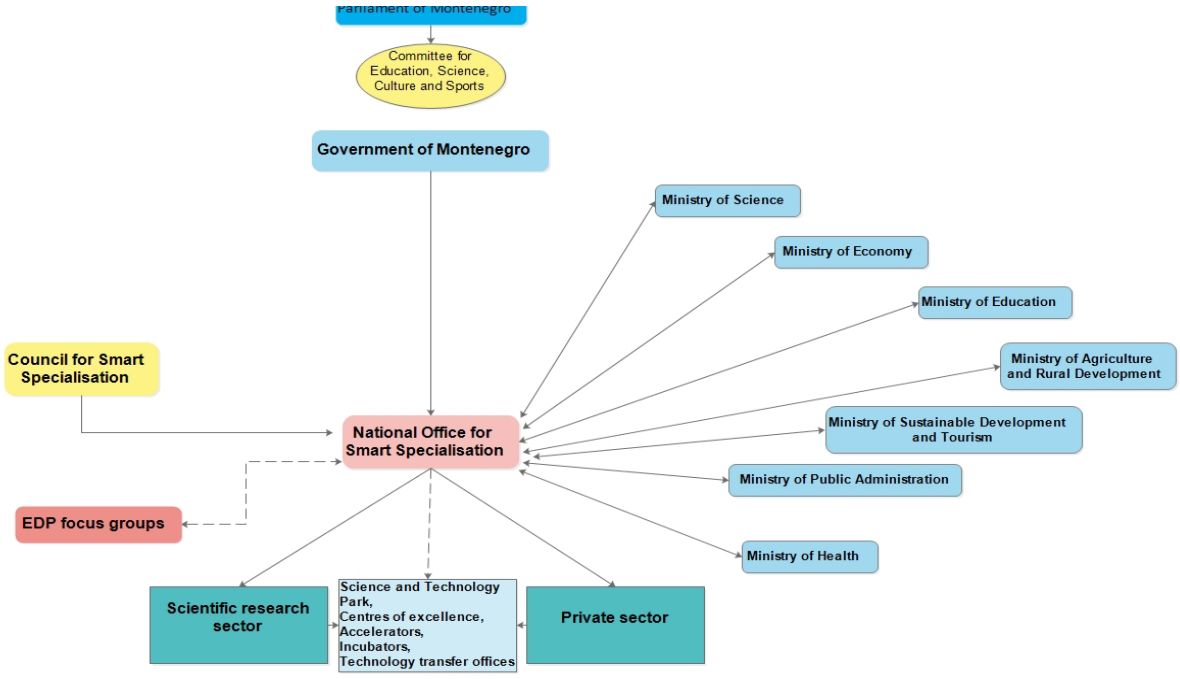
A basic organisational governance scheme for Montenegrin research and innovation system has not been significantly changed, but the activity of researchers and entrepreneurs has been strengthened in the past few years due to the more intense process of European integration and availability of the European funds for research and innovations, as well as investments into research and innovation infrastructure at the national level.

The governance of the system of research and innovation has been centralised at the national level, where the main roles are played by the Parliament and the Government. The Parliament is a legislative authority that passes laws, including the laws relating to scientific research and innovation activities, and ratifies international treaties on scientific-technological cooperation. The Parliamentary Committee for Education, Science, Culture and Sports has specific competences in the area of innovations (Figure 3).

On the other hand, through the Ministry of Science, the Government of Montenegro creates and implements the policy of research, development and innovation through national and international programmes of support to these activities. The Council for Scientific Research Activities, constituted within the Ministry of Science by the independent representatives of the academic and economic sector, monitors the implementation of strategies and laws in the area of research, development and innovations, providing expert suggestions in terms of improvement of the research and innovation policy. However, although the preparatory actions in relation to S3 and other policy documents are implemented by the Ministry of Science and the Council for Scientific Research Activities, the Government adopts the S3 directly, determining the budget for its implementation and approving the composition of the Council for Smart Specialisation and the National Office for Smart Specialisation.

The Ministry of Economy is responsible for implementation of the entrepreneurship and industrial policy, being also an important stakeholder in the implementation of the innovation policy, through the implementation of a series of programmes. Its organisational structure also includes the Intellectual Property Office. The Ministry of Education is responsible for higher education sector, within which scientific research activities are dominantly implemented.

**Figure 3 – Organisational scheme of research, development and innovations in Montenegro**




The National Office for smart specialisation works at the operational level and is supported primarily by the Ministry of Science, Ministry of Economy and Ministry of Education, as well as by the ministries responsible for projects in priority areas (Ministry of Health, Ministry of Public Administration, Ministry of Agriculture and Rural Development, Ministry of Sustainable Development and Tourism). The line ministries have constant communication with the National Office for S3. Its main activities are preparation and monitoring, as well as the organisation of evaluation of programmes and projects enabling successful implementation of the S3. Financial support for the S3 programmes comes from the ministries that are involved in certain programmes or projects from the S3 domain, international funds, and in part also through favourable credit lines for entrepreneurship from the Investment and Development Fund and the banking sector.

The role of the Council for Smart Specialisation is supervisory in nature. It supervises, advises and facilitates the transparency of work of the National Office for Smart Specialisation and encourages collaboration and participation of different segments of the society in the S3 implementation. The Council has a particularly prominent role in addressing the issues related to all thematic areas, as well as in ensuring the continuity of the Entrepreneurial Discovery Process (EDP).

The National Office for Smart Specialisation receives expert assistance from EDP focus groups specialised in individual thematic priorities of the S3. Through the activities of these groups, the continuity of the entrepreneurial discovery process in implementation of the S3 is enabled. This is provided through periodical meetings of EDP focus groups and an interactive Internet platform.

# III STRATEGIC VISION OF DEVELOPMENT

The strategic vision of development of Montenegro is based on the increase of competitiveness of the economy. A developed and competitive economy is based on knowledge and resources that should be utilised through related priorities of Research and Innovation Strategy for Smart Specialisation (S3). Such a concept of development is complementary with the achieved foreign policy priority – NATO membership. In addition, monitoring and implementation of goals, measures and initiatives regarding the Europe 2020 Strategy, including the national S3, are connected with the key medium-term priority – membership in the European Union.

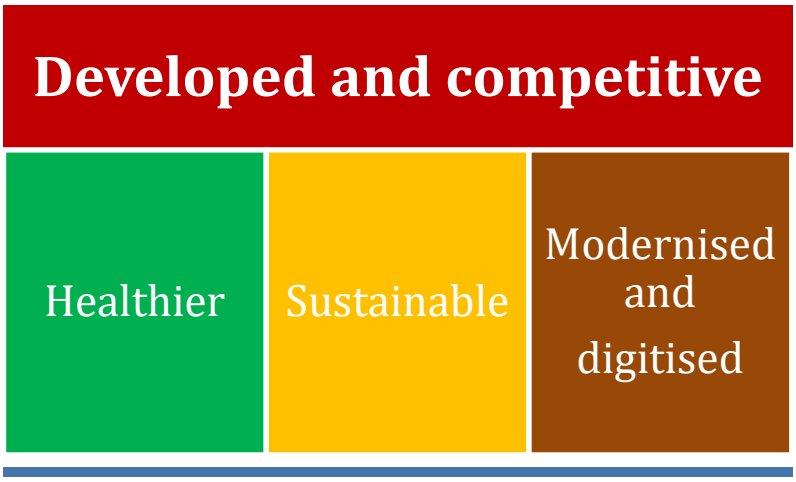
A developed and competitive country is based on three key strategic directions, as follows:

1. Healthier Montenegro,
2. Sustainable Montenegro,
3. Modernised and digitised Montenegro.

These directions are closely connected and present a logical continuation of meeting the goals of the Europe 2020 Strategy and an orientation to knowledge-based development, environmental protection, high employment level, productivity and social cohesion, with a focus on three interrelated priorities: smart growth, sustainable growth and inclusive growth.

The figure below represents a long-term development vision for Montenegro, which should, through related priorities of the Smart Specialisation Strategy (S3) and the increase in the use of the country's overall potentials, enable the fulfilment of the basic goal related to the overall prosperity of the country in general, based on the increase in the quality of life of every citizen in a real, sustainable and healthy manner, tailored to the people of the 21st century.

**Figure 4 – Strategic vision of the country's development**




**Healthier Montenegro**

With improved aspects of primary, secondary and tertiary protection and prevention and new products, strategic direction **"Healthier Montenegro"** will enable a higher level of life quality and therefore prosperity of the state. Healthier Montenegro is a centre of bio-medical development through new technologies, production of medicines, medicinal herbs and organic food and with provision of specialised healthcare services as a final product, with a view to attracting patients and researchers from the region and beyond. Healthier Montenegro is a society of technology for health, science, prosperity, regional cooperation and peace.

**Sustainable Montenegro**

Strategic direction "**Sustainable Montenegro"** relates to the fulfilment of the constitutional provision on Montenegro as an ecological state. This direction implies ecologically aware and efficient economy from the aspect of use and preservation of natural resources and an inter-generation level of prosperity. It relies on the millennium development goals, Europe 2020 Strategy and basic strategic documents in Montenegro. Above all, Sustainable Montenegro means further development and efficient use of natural resources. As the most important resource of the country, space has to be utilised in a manner that will prevent its devastation. Development of transport infrastructure and remediation of the ecological "black spots" have to rely on the innovative solutions and new technologies for a more comprehensive use of secondary raw materials and adequate reuse of waste on the principles of circular economy, creating prerequisites for sustainable development in this manner. Fulfilment of the tasks set forth in the area of environmental protection, especially the ones provided for in Negotiation Chapter 27, will have a positive influence on the country as a whole. The implementation of the above strategic goal is directly connected to all the priorities defined by the Smart Specialisation Strategy and is a necessary prerequisite for successful fulfilment of each of them.

**Modernised and digitised Montenegro**

Strategic direction **"Modernised and digitised Montenegro"** should enable reaching the standards of the EU that are related to Digital Agenda 2020, Single Digital Market Strategy and the new EU Industrial Policy Strategy. Development and application of ICT is of utmost importance for economic development. Reaching the standards and fulfilment of the goals will lead to development of trade, better use of capital and strengthening national competitiveness. Introduction of modern technologies and utilisation of available raw materials in priority sectors will result in the placement of high-quality products on the market. The foundations of this direction are related to better infrastructure, e-economy and information security. Fulfilment of this goal is also directly connected to all the priorities defined by the Smart Specialisation Strategy, which is why ICT has been defined as a horizontal sector that provides information and technology support to the selected priorities.

The aforementioned strategic directions for development of the S3 Strategy are based on the research and development potentials of the country. As such, they are complementary with the strategic goal of connecting research and innovation in the real sector, which should enable further development and an increase in the level of competitiveness of the national economy.

An example of a regional project incorporating all three strategic directions (healthier, sustainable, modernised and digitised) is the South East European International Institute for Sustainable Technologies (SEEIIST, http://seeiist.eu) – **Hadron cancer therapy with biomedical research with protons and heavy ions**. The implementation of this project would improve cooperation between science, technology and economy in the region, enabling the state-of-the-art and most successful method of treatment of a large number of cancer types. Therefore, the project is one of the best examples "Science for Peace".

# IV ANALYSIS OF POTENTIALS

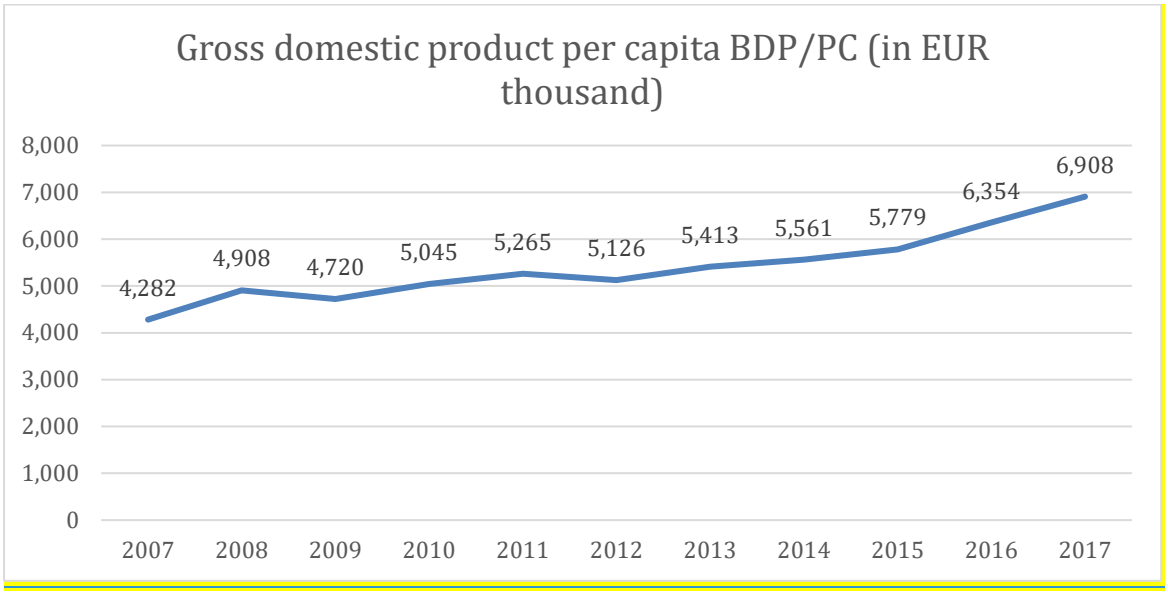
## IV 1. ANALYSIS OF ECONOMIC POTENTIAL

According to MONSTAT data, in 2017, Montenegro has achieved a positive economic growth rate of 4.4%. In the same year, the gross domestic product (GDP) amounted to EUR 4.299 billion, while the gross domestic product per capita amounted to EUR 6,908. The average annual inflation rate amounts to 2.4%.

Based on the IMF estimates, a growth rate of global economy in 2017 amounted to 3.7%. Developed countries grew by the average rate of 2.3% – US economy at a rate of 2.3%, Euro-zone countries at 2.7%, Japan at 1.7%. Based on the same predictions, a group of developing European economies, including Montenegro, achieved an average growth of 5.2% in 2017. For the period of 2018–2019, smaller growth rates have been predicted, amounting to 4%, and 3.8%.

According to the model forecast of the Central Bank of Montenegro, the growth of national GDP in 2018 will amount to 2.7-3.2%, with a central tendency of around 3%. Therefore, the growth of Montenegrin economy of 4.4% in 2017 is below the average growth of European economies amounting to 5.2% with an expected short-term decrease tendency, but not below the average growth in developed countries, and especially not below the Eurozone average of 2.7%.

**Figure 5 – GDP per capita**



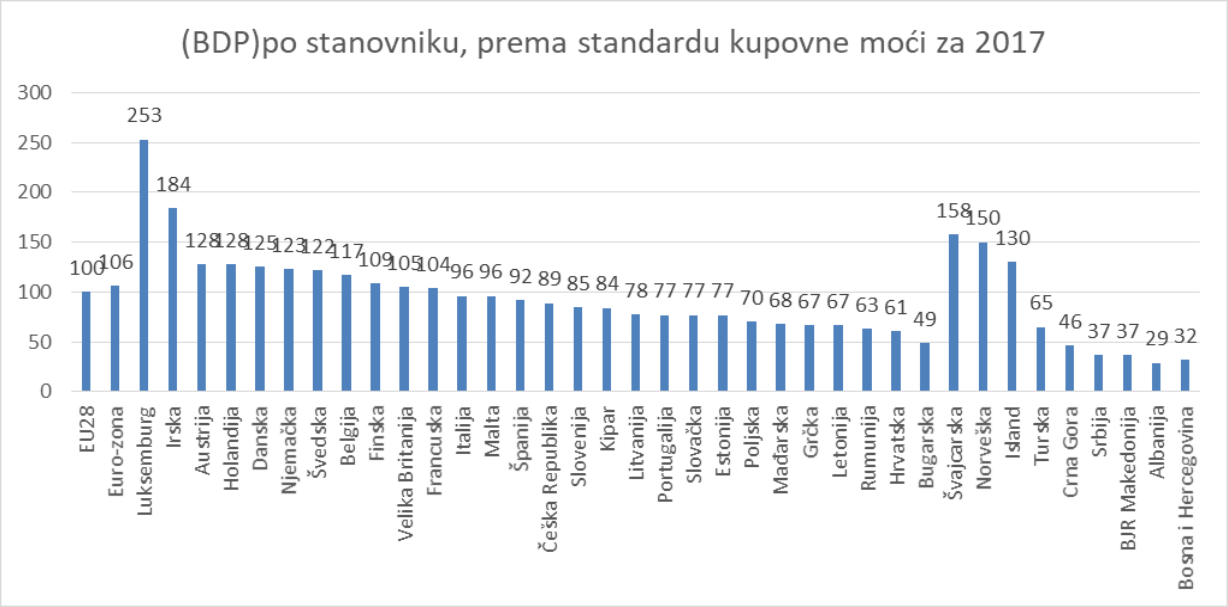

Based on the first Eurostat estimates, gross domestic product per capita measured at purchasing power parity[6] in Montenegro amounted to 46% of the EU-28 average in 2017.

As for the EU Member States, the largest GDP per capita measured at purchasing power parity was recorded in Luxembourg, being more than 2.5 times higher than the EU-28 average and

[6] Purchasing power parities (PPPs) are the rates for translation of currencies that are used to convert the economic indicators expressed in national currencies into a common artificial currency

amounting to 253% of the European average, with Bulgaria on the other side of the scale with 49% of the EU average.

**Figure 6 – GDP per capita, measured at purchasing power parity in EU-28 and the region**




As for the region, Croatia has the highest GDP per capita measured at purchasing power parity, which amounts to 61% of the EU average, while Montenegro is second-ranked with 46% of the EU average. Macedonia and Serbia are at the level of 37% of the European average, Bosnia and Herzegovina at 32%, while Albania is at the level of 29% of the European average.

Given the above overview of purchasing power parity, it can be concluded that Montenegro has positioned itself close to the top of the scale for the region, but slightly below Bulgaria as the lowest-ranked EU-28 Member State, i.e. slightly below 50% of the European average.

According to MONSTAT data, the average gross wage in Montenegro in 2017 amounted to EUR 765.00, which is an increase of 1.9% compared to the previous year. Average wage without taxes and contributions amounted to EUR 510.00 and was 2.2% higher compared to the previous year.

The number of employees in Montenegro in 2017 amounted to 182,368 on average and was 2.5% higher compared to the average number of employees in the previous year. Growth in the number of employees in 2017 was recorded in thirteen of the total of nineteen sectors, with the highest growth recorded in the sector of administrative and auxiliary services (17.7%), and the lowest in the sector of information and communication (0.1%)[7]. Unemployment rate published by the Employment Agency of Montenegro, amounted to 22.09% in December 2017, which is an increase of 0.76% compared to the rate recorded in December 2016.

Montenegro was visited by 2 million tourists in 2017, which is 10.3% more compared to the previous year. Twelve million overnight stays were realised in total, which is 6.3% more than in 2016. As for the construction industry, in 2017, a significant growth (51.5%) was recorded in terms of the value of executed construction works, and there was a growth in effective working hours of 24.5% compared to 2016. In addition, growth was recorded in the majority of transportation types in 2017, as well as in the forestry sector (production growth of 15.8%). It is

[7] Annual macro-economic report of the Central Bank of Montenegro, 2017

evident that the key growth sectors include tourism, construction industry, forestry and transportation, with continuous growth in trade.

Budget deficit consequently increases the net public debt, which, at the end of 2017, amounted to EUR 2.7 billion, of which EUR 2.2 billion accounted for foreign debt.

Net inflow of direct foreign investments in 2017 amounted to EUR 474.3 million, which is an increase of 27.6% compared to the previous year. Total inflow of direct foreign investments amounted to EUR 649.2 million, out of which ownership investments accounted for EUR 366.9 million, whereas the inflow in the form of inter-company debt amounted to EUR 247.1 million.

The main driver of the economic growth in the following period will be strong investment activity, as a result of planned capital investments for construction of the Smokovac–Mateševo highway, followed by the investments in the area of tourism, energy (for example, construction of a solar power plant in Briska Gora), telecommunications, etc.

In the latest Global Competitiveness Report for 2018, Montenegro was ranked 71st out of 140 countries encompassed by the survey. The analysis of the World Economic Forum is based on a number of factors that affect the competitiveness of a country[8]. In 2018, Montenegro improved its position with the largest progress recorded in the labour market pillar (25th position) and in the 12th pillar of competitiveness – innovation capacities (74th position out of 140 countries).

**Mapping of economic potential – methodology**

The goal of mapping of economic potential is to identify the sectors with proven advantages and potential for launching economic transformation. Economic mapping is based on the analysis of available economic data at a detailed sectoral level. Sectors have been selected on the basis of a combination of criteria, including: 1) the degree of sectoral specialisation compared to the EU-28, 2) the critical mass, i.e. a sufficiently large volume measured by the number of employees, 3) employment growth, 4) average wages compared to the average for Montenegro, 5) export performance; and 6) possible match with two different types of broader sectoral groups with cluster performance measurement and the presence of emerging sectors.

*Specialisation* is calculated by comparing the relative share of employment in a certain sector in total employment in Montenegro with the relevant share of employment in that sector in EU-28 in total employment in EU-28. The relation between these two shares is known as a location quotient (LQ), where location quotient above 1 indicates above-average concentration in a certain sector, whereas LQ below 1 shows a below average concentration in the particular sector. For economic mapping, a threshold of 1.5 was used. Thus, it is considered that the sector is specialised if its share in employment is at least 50% higher than the share of that sector in employment in EU-28.

*Critical mass* or volume of the sector has been added to the selection process in order to prevent the selection of very small sectors with marginal economic weight. Critical mass is calculated as share of employment in the sector in the overall employment. For each broad sectoral group, a different minimum share has been identified, with a lower share if there is a greater number of sectors at the most detailed sectoral level and a higher share if there is less sectors at the most detailed sectoral level.

Fast growing sectors have greater potential to lead to economic transformations. *Employment growth* in the period between 2011 and 2016 has been used as an additional selection criterion. Sectors are selected if the employment growth in the period between 2011 and 2016 amounted to at least 25%.

[8] Factors that affect competitiveness have been grouped into 12 pillars of competitiveness: institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, goods market efficiency, labour market efficiency, financial market development, technological readiness, market size, business sophistication, and innovation.

Sectors with *above average wages* contribute more to the economic development of the country. Wages should be at least 25% higher than the average ones in Montenegro.

In order to identify the degree of specialisation, critical mass, employment growth and relative wages, MONSTAT made available data at a detailed industry level, at the third level of NACE classification[9] (3-digit numerical codes), for the number of employees and gross wages for the period from 2011 to 2016.

Sectors are selected if they qualify both for the degree of specialisation and for the critical mass, or if they meet the conditions for employment growth or relative wages. In total, 46 sectors at the third level of NACE classification have been selected as specialised sectors.

When it comes to measuring the export performance, NACE classification data are not available. Instead, data for export in different groups of products have been used. The analysis indicated different groups of products in which Montenegro is specialised compared to the export performance of EU 28, including the following: meat and meat preparations, vegetables and fruits; beverages; hides, skins and fur skins, raw; metalliferous ores and metal scrap; electric current; iron and steel; non-ferrous metals. These groups of products have been used to assist in the mapping, with the use of detailed data at the sectoral level.

When it comes to boosting economic development, clusters are of great importance. In 2006, the European Commission launched the European Cluster Observatory, which provides statistical information, analyses and mapping of clusters and cluster policies in Europe for the EU Member States and other European countries. Sectors that are at a common location will probably have common interests or links. By identifying regional concentrations of economic activities at the fourth level of NACE classification in related sectors, the observatory defined 51 traded clusters (clusters that serve markets beyond the region in which they are located). Such regional clusters encompass sectors that serve markets beyond the region in which the cluster is located, as well as those that are completely exposed to the competition from other locations. These clusters are concentrated in regions and their high wages and high levels of innovative activities make them the key drivers of regional economies. Under the definition of the Observatory, clusters measure the existing connections because they are based on the existing industrial classification. It can be expected that more economic activities will occur where sectors overlap. In this regard, using, inter alia, information on mergers and acquisitions among the sectors, the European Cluster Observatory identified 10 cross-sectoral groups of sectors where the growth of cross-sectoral links is most probable. By using detailed 4-digit data of MONSTAT on employment, the largest clusters and growing sectors have been identified. This was used to support the mapping, along with the use of detailed data at the sectoral level.

**Mapping of economic potential – results**

A statistical overview and analysis of national economy data conducted in accordance with the aforementioned methodology have been summarised in Table 1 in Annex 1. The first two columns show identified specialised sectors. Columns 3 to 8 summarise the main characteristics of economic output used for sectoral identification, where different volume thresholds have been used for determined specialised sectors and for determining sectors with high employment growth or high relative wages (cells are colour-highlighted when a sector crosses a threshold). Column 9 indicates if the industry belongs to one of the traded clusters or growing sectors in which Montenegro has above-average strength. Column 10 indicates if the above-average performance of export of goods may be brought in connection with the sector. The final column indicates if a certain specialised sector may be paired with any of the priority sectors of the Government.

[9] NACE is a statistical classification of economic activities used by Eurostat, the statistical office of the European Union, as well as by the national statistical offices of the European countries.

Results of the analysis show that specialised sectors that should be given a development priority are the following ones: agriculture and food, energy, ICT, manufacturing industry, medicine and quality of life, construction and tourism.

## IV 2. ANALYSIS OF RESEARCH POTENTIAL

The Government of Montenegro adopted the Strategy of Scientific Research Activities (2017–2021) in December 2017. The Strategy introduces new measures and instruments that will enable better quality of research, access to modern technologies and infrastructures, better absorption of EU funds and strengthening of initiatives for a knowledge-based economy.

The Strategy has identified three strategic goals, namely: Development of human resources and research capacities, improving international cooperation and networking, and strengthening synergy between science and economy. The Strategy has further identified research areas of priority importance in which Montenegro has the greatest potential: Energy; Information and communication technologies; New materials, products and services; Medicine and health of people; Agriculture and food production; Sustainable development and tourism; and Science, education and identity. The measures and instruments defined in the Strategy will be thematically directed at S3 priorities.

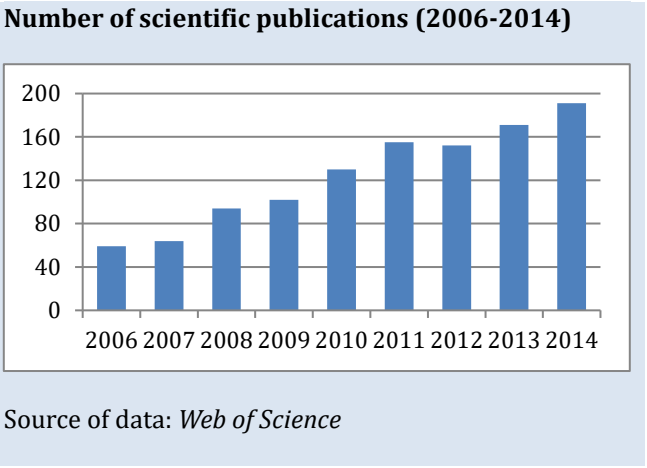
Scientific research institutions carry out scientific research within research priorities in accordance with their activities, and these are: Montenegrin Academy of Sciences and Arts (CANU) and institutions that have been granted a license to carry out scientific research activities in certain fields of science (universities, institutes, faculties and enterprises). Among them, in terms of the number of researchers and research infrastructure, as well as the achieved scientific research results, the state-owned University of Montenegro (UCG) is particularly prominent with its 19 faculties and three institutes. Three private universities also have significant resources (University of Donja Gorica, University of Mediteran and Adriatik University).

According to the *Global Competitiveness Report for 2018*, Montenegro is ranked 71st out of the total of 140 countries in terms of competitiveness of the national economy. Within the *Innovation Capacity* pillar, Montenegro is ranked 74th. Within this pillar, in terms of their quality, the Montenegrin research institutions are ranked 94th, in terms of its inter-institutional cooperation the country is ranked 59th, and in terms of investments in research and development the country is ranked 74th.

When it comes to the analysis of scientific potential, data on scientific publications have been used from two international data sources: *Web of Science* and *Scimago*.

Web of Science data suggest that in the period from 2006 to 2014, the number of scientific publications grew rapidly, at a rate of more than 20% annually (Figure 7). Most publications are in the fields of biological sciences, engineering, geoscience, mathematics, medical science and physics.

**Figure 7 – Number of scientific publications**




Source of data: *Web of Science*

The quality of scientific performance, measured by the country's share in the top-1% or the top-10% of the most cited publications worldwide, is below average, while in medicine and physics the share of Montenegrin publications is above the world average.

Scimago data also indicate that Montenegro, in comparison with other countries, specialises in Agricultural and Biological Sciences, Arts and Humanities, Computer Science, Economics, Econometrics and Finance, Energy, Engineering, Mathematics and Social Sciences (Table 2).

**Table 2 – Scientific specialisations**

| | 2006-2016 | 2011-2016 |
|---|---|---|
| Highly specialised | • Agricultural and Biological Sciences (416)<br>• Computer Science (575)<br>• Economics, Econometrics and Finance (79)<br>• Energy (114)<br>• Engineering (787) | • Agricultural and Biological Sciences (341)<br>• Computer Science (442)<br>• Economics, Econometrics and Finance (76)<br>• Engineering (574)<br>• Mathematics (199) |
| Strongly specialised | • Arts and Humanities (416)<br>• Mathematics (245)<br>• Social Sciences (185) | • Arts and Humanities (90)<br>• Energy (89)<br>• Environmental Science (132)<br>• Social Sciences (168) |

Source: SCImago (2018). SJR — SCImago Journal & Country Rank. Retrieved January 2018, from http://www.scimagojr.com. Between brackets is the total number of documents in the specified period.

Effects of internationalisation. i.e. direct contacts with leading research teams in several areas already produce visible results under the new applications for projects within the Horizon 2020. Since 2014, Montenegrin research teams have participated in 14 projects, four of which have been completed.

Projects are from the following areas:

- Five projects in the area of Research infrastructure including e-infrastructure;
- Two projects in the area of Health, demographic changes and welfare;
- Two projects in the area of Health safety, sustainable agriculture, marine and maritime research and bio-economics;

along with one project in each of the following areas:

- Safe, clean and efficient energy;
- Climate action, environment, efficiency of resources and raw materials;
- Marie Skłodowska-Curie actions – Researchers' Night;
- Leadership in future and industrial technologies – Space;
- Innovation in small and medium-sized enterprises (special contract on grant with the Enterprise Europe Network (EEN).

Based on the available data, six projects with the "third party" status have also been financed from H2020, including two in the area of research infrastructure, including e-infrastructure, one in the area of health, demographic changes and welfare, and three in the area of information and communication technologies.

According to the report from the project "Western Balkans Research Capacities" (December 2017), financed through the EU programme Erasmus+, of the three Montenegrin universities considered, the dominant share of the University of Montenegro is apparent in almost all research areas.

**Table 3 – Distribution of the number of publications in the period of 2012–2016 (for six most productive areas)**

| Area | University of Montenegro | University Mediteran | University Donja Gorica |
|---|---|---|---|
| Engineering | 410 | 9 | 9 |
| Computer Science | 336 | 21 | 7 |
| Agricultural and Biological Sciences | 223 | | |
| Mathematics | 144 | 5 | 8 |
| Social Sciences | 122 | 3 | 4 |
| Economics, Econometrics and Finance | | | 4 |
| Business, Management and Accounting | | 2 | |
| Total | 1235 | 40 | 32 |

Dominant research areas for the University of Montenegro are engineering, informatics, agricultural and biological sciences.

Analysis of research performance of the institutes that are not linked to the universities is shown in Table 4.

**Table 4 – Distribution of the number of publications by institutes 2012–2016**

| Name | Number of papers | | | | | |
|---|---|---|---|---|---|---|
| | 2012 | 2013 | 2014 | 2015 | 2016 | 5y total |
| Institute for Public Health | 4 | 14 | 6 | 6 | 12 | 42 |
| Institute of Hydrometeorology and Seismology | 3 | 0 | 1 | 4 | 1 | 9 |
| Clinical Centre of Montenegro | 12 | 22 | 11 | 23 | 24 | 92 |
| Institute of Modern Technology | 0 | 0 | 2 | 0 | 0 | 2 |
| Agency for Medicines and Medical Devices | 0 | 0 | 2 | 1 | 1 | 4 |

The two most productive organisations are the Clinical Centre of Montenegro and the Public Health Institute, with dominant productivity in medicine and the fields of biochemistry, genetics and molecular biology.

## IV 3. ANALYSIS OF INNOVATION POTENTIAL

Research and development (R&D) represent a significant component of innovation and a key factor in development of new competitive advantages. Enterprises that strive to retain their

competitiveness have to invest in research and development, by developing new technologies or absorbing the existing ones from domestic, as well as from international sources.

In 2016, Montenegro systematically directed its efforts at creating and shaping a sustainable and efficient innovation ecosystem through the adoption of the Law on Innovative Activities and the Strategy of Innovative Activities (2016-2020) with the Action Plan.

The strategic and legal framework have defined the goals and priorities of innovative activities for the period of 2016-2020. The focus has been placed on three main strategic goals: Increasing the capacities for innovation and technological development of Montenegro (projects of the Centre of Excellence and Science and Technology Park, and the Innovation and Entrepreneurship Centre "Tehnopolis" has been opened); Strengthening the instruments of integration and cooperation of actors in the innovation system; and Strengthening the potential for innovation in the business sector.

With the support of the European Commission, the Ministry of Science has started a project on establishing an innovation ecosystem with a focus on start-ups in June 2018. In parallel, the Ministry of Science has established a partnership for improving the innovation ecosystem at the national level and is working to prepare the national support programme for innovative start-ups, which is envisaged for late 2018.

In addition to the establishment of an institutional framework for the development of new technologies, support programmes are implemented for the development of innovations in the economy, and so are collaborative grants encouraging the cooperation of the economy and science with a view to commercialisation of innovations, as well as information and advisory support necessary for the transfer of technological solutions, knowledge and experience (EEN network).

Pursuant to the Global Innovation Index[10] for 2018, Montenegro was ranked 52nd among 126 countries involved in the survey. Based on the GII2018, Montenegro is among the 20 countries that have better results in innovation than in the level of development. These data indicate the importance of the research potential of a country.

Based on the technological readiness factor within the Global Competitiveness Index for 2017-2018, Montenegro is ranked 48th out of a total of 137 countries. The technology used in the industry in Montenegro is characterised by its obsolescence and technological underdevelopment, as well as by lower processing phases and the lack of high technology development.

The total number of patent applications in Montenegro from 2008 to 2018 is provided in the Table below, pursuant to the International Patent Classification[11]. Table 5 provides an overview of a total of 99 national patents submitted, with the structure of areas they relate to.

[10] The Index illustrates multidimensional aspects of innovations by providing a rich and detailed database at the global level, encompassing 90.8% of the world population and 96.3% of GDP.

[11] This classification encompasses all fields of knowledge that may be considered adequate for obtaining patent protection for inventions.

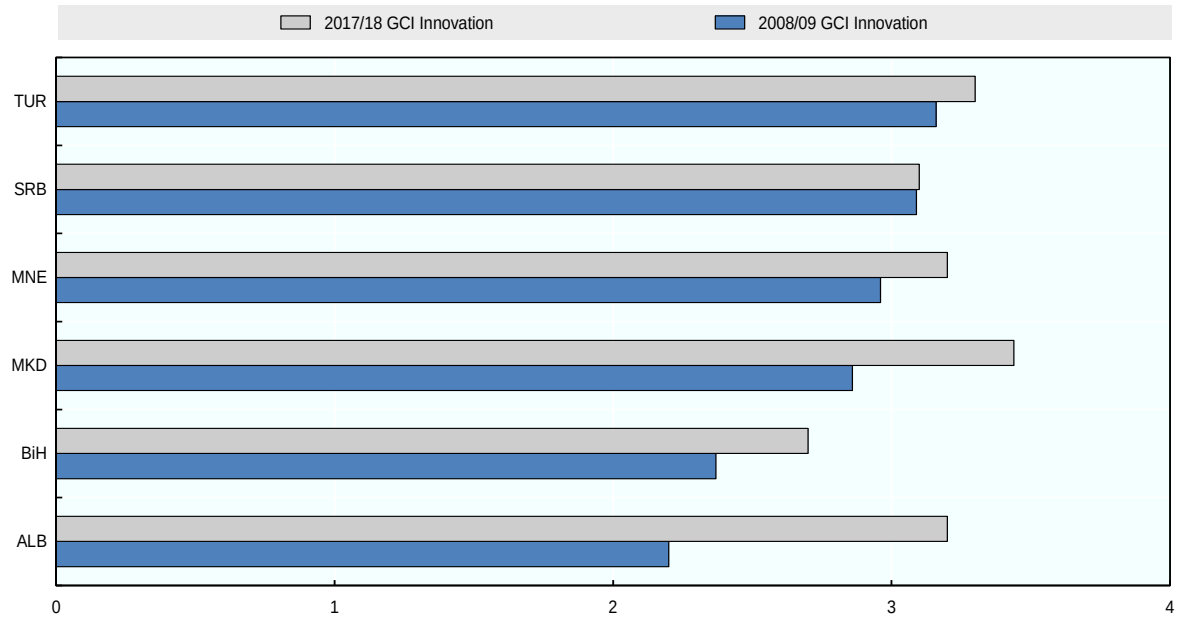
**Table 5 – International Patent Classification – National Patents (2008-2018)**

| Classification | Number of cases | % |
|---|---|---|
| A/current subsistence needs | 28 | 28.28 |
| B/processing and manufacturing; traffic and transportation | 9 | 9.09 |
| C/chemistry; metallurgy | 6 | 6.06 |
| E/construction and mining | 23 | 23.23 |
| F/mechanical engineering; lighting; heating; weaponry; ammunition | 21 | 21.21 |
| G/ physics | 1 | 1.01 |
| H/electrical engineering | 11 | 11.11 |

* Total national patents: 99

Although the economies of the Western Balkans are still lagging behind the EU in terms of innovation performance, growth has been identified. Thus, over the past 10 years, based on the global competitiveness reports for the respective years, Montenegro grew from the score of 2.8 (in 2008/2009) to 3.2 (in 2017/2018) out of the maximum of 7 points. This reflects the overall increase in the capacity of countries for innovation, improved policy framework for innovation, as well as improved quality of scientific research institutions. However, the region continues to have particularly low private sector investments in research and development (R&D)[12].

***Figure 8 – Global Competitiveness Index, Innovation scores***




According to the latest official data, total domestic investments in research and development in 2016 amounted to 0.32% of GDP. Compared to the EU-28, the entrepreneurial-business sector in Montenegro has a relatively small share in total R&D spending, amounting only to 0.05% of GDP in 2016, while amounting to an average of 1.32% in EU-28 the same year. The entrepreneurial-

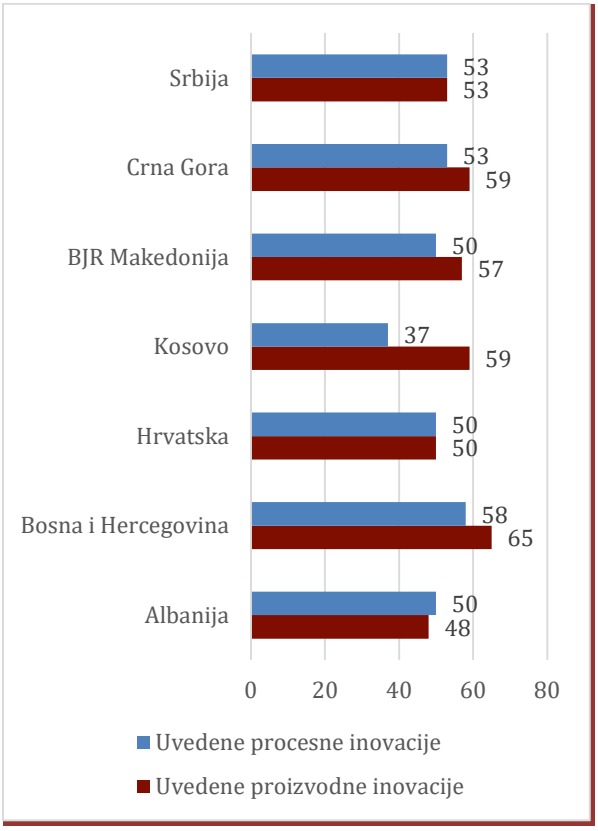
[12] (World Economic Forum, 2008) (World Economic Forum, 2017)

business sector employs about 7.75% of all persons engaged in research and development in Montenegro. The number of researchers in the entrepreneurial-business sector is 234.

The available data indicate that the entrepreneurial sector invests little in research and development. This limits the ability of enterprises to develop new products, as well as their ability to absorb technologies from abroad. One of the limiting factors is the inaccessibility of detailed statistics on research and development at the industry level for Montenegro, which is, to a significant extent, explained by a small number of participants from the entrepreneurial-business sector engaged in research.

The latest results of the Balkan barometer (2016) show that almost 60% of Montenegrin enterprises have introduced a certain production innovation, while more than 50% have introduced a certain process innovation (Figure 9). The results of Montenegrin surveys related to research and development indicate that R&D activities are below the level of other European countries. In the enterprise sector, spending on R&D amounts to only 0.11% of gross domestic product for 2015, while the average for EU-28 amounted to 1.31%. Pursuant to the survey above, share of enterprises in Montenegro included in the innovation activities is smaller than the share in majority of European countries.

***Figure 9 – Share of enterprises (%) with innovation activities (2016)***




*Source: Balkan Barometer 2016*

**Conclusion on economic, research and innovation mapping results**

The economic, research and innovation mapping results need to be integrated with a view to identification of priority sectors on which the smart specialisation should focus, by directing the instruments and measures of the national policy. However, this integration is not easy to implement, because of the fact that the results of economic and innovation mapping are not given at the third level of NACE classification, while the unit of analysis for research mapping is not a sector but a scientific field.

Based on the analysis of research capacities of already identified priorities through the analysis of economic potential (agriculture, energy, ICT, manufacturing industry, healthcare and quality of life, construction and tourism), it is obvious that agriculture, ICT, medicine and human health, as well as energy have a recognised research potential (Scimago, H2020), while the priority sectors of construction and materials science (manufacturing industry) have weaker research potential and are at the middle of the list on the global level (Scimago). In the sector of tourism, the dynamism of research activities at the global level is weaker compared to the other mentioned sectors and it is interesting that in this category Montenegro is ranked at the middle of the list (Scimago).

As for the innovation potential, from the point of view of structure of patents in the last 10 years, energy and agriculture are the leading sectors, followed by new materials, medicine and construction.

From the above, it can be concluded that identified economic specialisation areas have research and innovation potential support, but with different potentials and internationally recognised results.

# V SWOT

***STRENGTHS***

- The presence of internationally well-integrated excellent research teams / individuals;
- The existence of a legal and institutional framework;
- Developed higher education system;
- Attractive location and size of the country for pilot projects based on new technologies;
- Availability of highly educated labour force;
- Environmental preservation, availability and diversity of natural resources;
- Good telecommunication infrastructure;
- Presence of large international companies in the field of ICT.

**WEAKNESSES**

- Lack of "critical mass" within the scientific and research community due to fragmentation and isolation;
- Insufficient transfer of knowledge and technology from European laboratories;
- National budget funds for research and innovation are insufficient;
- Weak administrative capacity for absorption of available pre-accession funds;
- Insufficient participation of the private sector in research and innovation activities;
- Limited success in competitive international research and development programmes;
- Weak connections between R&D institutions and the business sector;
- Lack of statistical data on innovation and development that are aligned with those of the European Union;
- Most enterprises are micro and small;
- Low level of overall investment in research and innovation.

**OPPORTUNITIES**

- Enabled access to the leading international R&I funds;
- Opportunities for placement of knowledge, innovations and innovative technologies;
- Availability of natural resources and secondary technogenic raw materials for new industrial projects;
- Local companies introducing innovations in energy, tourism, production and agriculture;
- Exercising further access to large international research infrastructures (CERN, EMBL, etc.);
- Implementation of a "large research infrastructure for sustainable technologies" in South East Europe – SEEIIST;
- Use of human R&I potential in the diaspora;
- Taking the leading role in projects supported by international R&I programmes;
- Adequate presence of cluster formation with a particular role in the innovation chain.

**THREATS**

- Loss of highly qualified research and innovative human resources;
- Unfavourable demographic trends and migration;
- Administrative barriers for investment and business development;
- Low labour force productivity;
- Competitiveness at the regional and global level;

- Insufficiently developed traffic infrastructure.

# VI STRATEGIC S3 PRIORITIES

Pursuant to the strategic development vision of Montenegro, through the application of S3 methodology and implementation of the Entrepreneurial Discovery Process, five priority economic areas have been defined. By investments, as well as through development of innovative and research potential in the proposed priority areas, new opportunities will be created for entrepreneurial activities and development of a knowledge-based economy.

Proposed priorities are as follows: Renewable energy sources and energy efficiency, Sustainable agriculture and food value chain, Advanced materials and sustainable technologies, Sustainable and health tourism and ICT, where ICT is a horizontal sector as it provides business and technological support to other priority sectors (Table 6).

**Table 6 – Priorities and connection with development vision**

| **PRIORITIES** | **DEVELOPMENT VISION OF MONTENEGRO** | | | |
|---|---|---|---|---|
| | Healthier | Sustainable | Modernised and digitised | **Developed and competitive** |
| Sustainable agriculture and food value chain | x | x | x | x |
| Renewable energy sources and energy efficiency | | x | x | x |
| New materials and sustainable technologies | | x | x | x |
| Sustainable and health tourism | x | x | | x |
| ICT | | | X | X |

## VI 1. NEW MATERIALS AND SUSTAINABLE TECHNOLOGIES

Montenegro has committed to provide for compliance of development needs with the principles and criteria of environmental and spatial protection in the growth and development of industrial and construction capacities. The share of industrial production in the formation of GDP currently amounts to 11.6%, while the share of the manufacturing industry is 4.7% of the domestic product. The manufacturing industry sector is, inter alia, dominated by the production of steel, aluminium, other non-ferrous mineral products, as well as by wood processing. The share of industry in the total export is 91.5%. In the past period, Montenegro has preserved the foundation to continue the production of base metals and metal products, so metal sector products (aluminium, steel) account for about 30% of total industry export. Metal products are widely used in construction, which is a significant development opportunity, especially as the construction sector recorded the highest growth (8.8%) in relation to all industrial sectors, with construction materials representing a large part of Montenegrin total commodity imports (~ 20%). The expansion of the construction sector is the result of intensification of investments, primarily in infrastructure and tourism.

The manufacturing industry sector generates large quantities of waste resulting from production in industrial systems such as UNIPROM – Aluminium Plant Podgorica, Tosçelik (Steelworks) Nikšić, Thermal Power Plant Pljevlja, and in small and medium-sized enterprises. The largest potential and usable value in the industrial waste structure lies with fly ash, red sludge, slag, metal dust and wood waste. By applying appropriate technologies, some types of industrial waste can be converted into ecological construction materials, which represents a new development opportunity on the principles of circular economy. Since the metal production area mainly accounts for the production of base metals, a focus must be placed on products with added value, achieved by a higher degree of final processing, modernisation of existing capacities and development of new manufacturing capacities in the SME sector. All waste recycling processes that can provide a competitive product, especially in the construction materials sector, should become a priority. Fulfilment of this priority must be accompanied by training of quality staff and improvement of research infrastructure. The existing waste, which has been generated in the territory of Montenegro for decades, opens an opportunity for good connection with specialised waste recycling companies in Europe and beyond. Examples include red sludge and fly ash for which a certain interest has already been expressed by foreign companies in terms of joint investments and the development of technological knowledge for further utilisation.

**VISION 2024**

Montenegro with a modernised and sustainable industry that enables greater competitiveness in the international market by stimulating the use of modern materials and technologies based on domestic knowledge, innovations, natural resources and principles of circular economy.

**SECTORAL GOALS**

| |
|---|
| Increase of recycling and valorisation of industrial waste based on innovation and principles of circular economy |
| Increase in production and use of innovative eco materials |

**FOCAL AREAS AND TECHNOLOGIES**

EXISTING

- Processing and use of eco materials;
- Sustainable technologies in processing metals and alloys.

WITH POTENTIAL

- New applications of industrial and construction waste (fly ash, red mud, slag, metal dust, wood waste, etc.);
- Production of new ecologically acceptable construction materials;
- Processing and use of ecological construction materials based on wood and stone;
- Promotion of technologies for valorisation of mineral raw materials (bentonite, white bauxite and carbonate rocks) for the needs of food industry, production of ceramic products and agriculture.

**RESEARCH AND INNOVATION ENVIRONMENT**

SCIENTIFIC AND EDUCATIONAL INSTITUTIONS

- University of Montenegro, University of Donja Gorica, Montenegrin Academy of Sciences and Arts.

COMPANIES

- Around 30 larger, small and medium-sized enterprises have been identified from industrial and construction sector as well as the Innovation-Entrepreneurship Centre "Tehnopolis" (IPC Tehnopolis)

BUSINESS ASSOCIATIONS

- Chamber of Economy of Montenegro, Montenegrin Employers Federation, Montenegro Business Alliance

PUBLIC INSTITUTIONS

- Ministry of Economy, Ministry of Science, Ministry of Sustainable Development and Tourism, Investment and Development Fund, Ministry of Education, Ministry of Agriculture and Rural Development.

CIVIL SECTOR

- Academy of Engineering Sciences.

**Synergistic effect in relation to other priority sectors**

| | **New materials and sustainable technologies** |
|---|---|
| **Sustainable and health tourism** | - Application of nanomaterials in health tourism<br>- Application of mineral raw materials in cosmetology and pharmacy (bentonite and carbonate rocks) |
| **Renewable energy sources and energy efficiency** | - Application of modern materials and technologies for electrical energy production and transmission |
| **Sustainable agriculture and food value chain** | - Production of biological (biodegradable) and smart packaging for agricultural products<br>- Development of biological products and biopesticides<br>- Production of fodder through the use of mineral raw materials (carbonate rocks) |
| **ICT** | - Efficient management of production facilities through the use of ICT<br>- Smart houses and smart cities |

**KEY INDICATORS**

| **Indicator** | **2018** | **2024** |
|---|---|---|
| Share of the industry in GDP | 11.6% (2017) | 13% |
| Share of processed in overall industrial waste | 2.5% | 6% |

## VI 2. SUSTAINABLE AGRICULTURE AND FOOD VALUE CHAIN

Agriculture is a sector that plays a multiple role in the development of society and economy of Montenegro. Its economic importance is reflected in the high contribution to GDP creation (more than 7%, while accounting for about 2% at the EU level). There is even greater share of agriculture in the employment of the labour force, since almost one fourth of the total number of employed people in Montenegro are engaged in family farms. In addition, agriculture plays other important roles as well: it constitutes the basis for the entire food chain (food industry and related sectors); it supports the development of tourism in an indispensable manner; it encourages the development of many other sectors (production of equipment, machinery and packaging, transport and numerous services); it is crucial in the sustainable development and mitigation of the depopulation of rural areas; it contributes to the preservation of the environment, biodiversity and landscapes; it contributes to the fight against poverty in rural areas and is an important factor in preserving tradition and the overall cultural heritage of the Montenegrin villages.

There are a number of development opportunities offered by agriculture and the food value chain relying on it: 1) creating new jobs for different professional profiles; 2) huge opportunities for the placement of knowledge and innovative technologies across the entire food value chain; 3) safe

growth potential and generating new value through sustainable use of local raw materials; 4) a wide range of local products to improve the overall tourism offer; 5) favourable conditions for organic production justifying the orientation of Montenegro as an ecological state; 6) a combination of tradition in the production of numerous products and innovative technologies; and 7) producing by-products used as raw materials in energy production.

To invest in sustainable agriculture means to use investments rationally, because, in addition to synergy with numerous sectors, it brings along a number of social benefits (immaterial and immeasurable ecosystem services). Agriculture in Montenegro is characterised by diversity of production by regions (the diversity of agri-ecological and climate conditions enables great diversity of cultivated plant varieties and animal species), as well as by the existence of a large number of autochthonous species and varieties in plant and breeds in livestock production. Agriculture is also marked by high complementarity with other priority sectors, especially with tourism as the driver of all types of agritourism and health tourism through the presentation of traditional gastronomy in the context of the tourist offer. Also, the sustainable development of the sector mitigates the negative demographic trends, contributes to the balance in territorial development, enables the inclusion of different groups and contributes to the mitigation of the consequences of climate change.

**VISION 2024**

Montenegro is recognised for agriculture based on knowledge and innovation and is developing on the principles of sustainability, preserving the tradition and values of the rural areas, complementing the beauty of the Montenegrin landscapes and forming a vital basis for the food value chain that offers a wide range of authentic products to the consumer.

**SECTORAL GOALS**

| |
|---|
| Strengthening the value chain of organic production |
| Development of new agricultural products |

**FOCAL AREAS AND TECHNOLOGIES**

EXISTING

- Meat and meat products (traditional and new products);
- Wine (from autochthonous and introduced vine varieties, new types of wines, aromatic wines, grape seed oil, dried grapes) and beer;
- Dairy products: traditional and new (including autochthonous cultures for producing dairy products);
- Fisheries and aquaculture products;

WITH POTENTIAL

- Development of organic agriculture in all key agricultural sectors;
- Innovation, creation of new products and application of new technologies for food production, including production of environmentally friendly and smart packaging, biological products, biopesticides, as well as smart waste management;

- Creation of new fruit and vegetable products;
- Growing and collection of medicinal, aromatic herbs and mushrooms (production of oil, cosmetic products, pharmaceuticals, spa products, spices, beverages, etc.);
- Production of potato and related cereals and buckwheat (integral flours, broad spectrum of products, etc.);
- Olive oil and other olive products.

**Synergistic effect in relation to other priority sectors**

| | **Sustainable agriculture and food value chain** |
|---|---|
| **Sustainable and health tourism** | • Production of medicinal herbs, essential oils, cosmetic, spa and other products |
| **Renewable energy sources and energy efficiency** | • Energy efficient and smart management of agricultural production<br>• Efficient use of waste as an energy generating product |
| **New materials and sustainable technologies** | • Production of biological (biodegradable) and smart packaging for agricultural products.<br>• Development of biological products and bio-pesticides.<br>• Production of fodder through the use of mineral raw materials (carbonate rocks) |
| **ICT** | • Smart and efficient management of agriculture<br>• Application of sensors for monitoring healthy food and environment (bio-sensors, smart buoy, smart bee hive, etc.)<br>• BIO-ICT centre of excellence. |

**RESEARCH AND INNOVATION ENVIRONMENT**

SCIENTIFIC AND EDUCATIONAL INSTITUTIONS

- University of Montenegro, University of Donja Gorica, Public Health Institute, Montenegrin Academy of Sciences and Arts

COMPANIES

Around 40 companies have been identified in manufacturing meat and dairy products, vegetables and food, herbs and aromatic plants and mushrooms, production of honey, olive oil, potato and cereals, fisheries and aqua-culture. As for the wine production, Plantaže 13. jul company has a dominant role (plus 70 small vineries) and as for the beer production, the best-known brewery is Trebjesa – Nikšić.

BUSINESS ASSOCIATIONS

- Chamber of Economy of Montenegro, Montenegrin Employers Federation, Montenegro Business Alliance, National Association of Beekeepers, Association of Olive Producers "Boka", Ulcinj,

National association of vine-growers and wine-makers, Cluster of registered cheese producers, Cluster of small wineries, Cluster of fisheries, Cluster of olive producers, Montenegrin prosciutto cluster, Raspberry producers cluster.

PUBLIC INSTITUTIONS

Ministry of Agriculture and Rural Development, Ministry of Economy, Ministry of Science, Ministry of Sustainable Development and Tourism, Monteorganica – Montenegro's certification body, Investment and Development Fund, local self-governments, Administration for Food Safety, Veterinary and Phytosanitary Affairs, Institute of Hydrometeorology, Intellectual Property Office, Centre for Ecotoxicological Research

CIVIL SECTOR

- Centre for Consumer Protection

**KEY INDICATORS**

| **Indicator** | **2018** | **Targeted value 2024** |
|---|---|---|
| Certified areas in organic production | 1,762 ha (2017) | 3,500 ha |
| Percentage of used in relation to available agricultural land | 256,361 ha (2017)<br>49.5% | 300,000 ha<br>55% |
| Gross value of agricultural production | EUR 295,472,000 (2016) | EUR 330,000,000 |

## VI 3. RENEWABLE ENERGY SOURCES AND ENERGY EFFICIENCY

The electrical energy sector in Montenegro has undergone major changes in recent decades. The traditional, vertically integrated, monopolistic electrical energy system (EES) has been replaced by a deregulated system, with the electrical energy market as an important link in defining the price of delivered energy. As a pretender for EU membership, Montenegro committed itself to respecting the relevant European regulations and policies, including the increase in the share of energy use from renewable sources. In this regard, numerous projects in the field of renewable energy sources have been implemented, or are in the process of implementation, such as the projects for the construction of mini hydro power plants, two large wind farms and a large solar power plant. In addition to the aforementioned activities, the implementation of the project for the installation of an underwater electrical energy cable is in the final phase, which will enable the connection of the electrical energy systems of Montenegro and Italy. If the need for the implementation of storage

capacities for electrical energy is added to the above, primarily aiming at increasing the reliability of consumers' supply, it becomes clear that the EES of Montenegro is getting a completely new physiognomy. Accordingly, economical, environmentally friendly and reliable production, transmission and consumption of electrical energy, as well as a way of optimal management, become the main challenges of the modern electrical energy sector in Montenegro.

Montenegro has a great potential for renewable energy sources and although hydro energy already provides for two-thirds of the total energy production in the country, only 17% of the potentially available hydro energy potential has been exploited so far. Until recently, hydro energy has been the only renewable energy source that significantly contributes to energy production in Montenegro.

The potential of large hydropower plants on the main rivers in Montenegro is 9846 GWh, while on smaller rivers it amounts to 800-1000 GWh per year. Technically and economically justified useful potential on the main rivers in Montenegro is between 3.7 and 4.6 TWh / year. For comparison, the real useful potential for small hydropower plants is estimated at 400 GWh per year. Based on currently granted concessions, 20 small hydro power plants have been realised so far, with a total installed power of about 33 MW. Overall, the theoretical potential for hydro energy in Montenegro is slightly less than 11 TWh / year, of which 5.7 TWh / year can be used in an economically quality manner.

Montenegro has a significant wind potential for high-speed zones, i.e. areas with wind speeds above 7 m/s. The potential increases further if medium potential zones are considered as well. Energy produced from wind can reach up to 25% (925 GWh) of annual energy consumption in the country. The latest projects, such as the Krnovo wind farm (72 MW) and Možura (46 MW, under construction), point to the direction of the future development of the wind potential. Given that the wind farm at Krnovo is located at the highest altitude in Europe so far, it can be said that Montenegro has positioned itself as a testing environment for the application of technologies in extreme conditions.

The average annual number of sunny hours in Montenegro is more than 2,000, while the coastal areas have more than 2,500 hours of sunshine per year. The solar energy has so far mainly been used for solar thermal heating and cooling of individual buildings, although only to a neglectable degree. The construction of the large first solar power plant at Briska gora is now planned as well (200 MW – which is equal to the capacity of Thermal Power Plant Pljevlja).

Montenegro has great opportunities to use the wood waste energy potential. The annual increase in the amount of wood, as the most important energy source of this type, is estimated at 2.6 $m^3$ / ha per year, while the current level of wood consumption is estimated at about 1.03 $m^3$ / ha per year. The estimated total tree increment is between 850,000 $m^3$ / year and 1,060,000 $m^3$ / year. In Montenegro, the wood waste energy potential amounts to 400 MW.

Finally, the new underwater electrical energy cable between Montenegro and Italy will start operating in 2019, which will enable the country to take the position of a regional energy exchange hub.

**VISION 2024**

Montenegro is recognised as regional energy hub with high level of consumption of electrical energy from renewable energy sources and application of results of research and innovations in all segments of the energy sector.

**SECTORAL GOALS**

| |
|---|
| Increasing energy efficiency and use of renewable energy sources |
| Development of the concept of smart networks and cities through application of research results and innovative solutions |

**FOCAL AREAS AND TECHNOLOGIES**

EXISTING

- Wind energy (research in the field of thermal anemometry, turbulent flows, protection of electric power systems from atmospheric discharges, etc.);
- Hydro energy (research into transients in hydraulic systems, etc.);
- Energy efficiency, improvement of energy balance, reduction of consumption and CO2 emissions (renewal of buildings, LED technologies, eco active/passive facilities).

WITH POTENTIAL

- Solar energy (establishment of first solar power plant, transfer and adaptation of technologies to our geographical position);
- Development of energy storage systems;
- Smart networks and cities;
- Active consumption (self-production) of energy;
- Transport electrification.

**RESEARCH AND INNOVATION ENVIRONMENT**

SCIENTIFIC AND EDUCATIONAL INSTITUTIONS

- University of Montenegro, University of Donja Gorica, Mediteran University, Montenegrin Academy of Sciences and Arts

COMPANIES

- Several large state-owned energy companies have been identified, among which the largest is EPCG, as well as a significant number of small and medium-sized enterprises in the area of hydro-energy and several large enterprises in the area of wind energy, as well as several engineering enterprises that provide support to large energy systems.

BUSINESS ASSOCIATIONS

- Chamber of Economy of Montenegro, Montenegrin Employers Federation, Montenegro Business Alliance, Association of Oil Companies of Montenegro.

PUBLIC INSTITUTIONS

- Ministry of Economy, Ministry of Science, Ministry of Public Administration, Ministry of Education, Ministry of Sustainable Development and Tourism, Energy Regulatory Agency, Montenegrin Electrical Energy Market Operator.

CIVIL SECTOR

- Academy of Engineering Sciences, CG KO CIGRE (Montenegrin National Committee for the International Council on Large Electric Systems)

**Synergistic effect in relation to other priority sectors**

| | **Renewable energy sources and energy efficiency** |
|---|---|
| **Sustainable agriculture and food value chain** | • Energy efficient and smart management of agricultural production<br>• Efficient use of waste as an energy generating product |
| **New materials and sustainable technologies** | • Application of modern materials and technologies for electrical energy production and transmission<br>• Energy efficiency of buildings |
| **Sustainable and health tourism** | • Energy efficiency of tourist and healthcare facilities |
| **ICT** | • Optimum management of the electrical energy systems and networks<br>• Energy and data transmission<br>• Managing data for smart use of energy sources or engaging network capacities<br>• Cyber security<br>• Smart energy systems – smart energy and information transportation<br>• Smart trade and electrical energy management – energy market<br>• Management of data on energy research on the state of affairs and potential in energy<br>• Development of a business intelligence system in energy<br>• Green ICT |

**KEY INDICATORS**

| Indicator | 2018 | 2024 |
|---|---|---|
| Increase of production from renewable energy sources in relation to final consumption | 33% (2017) | 43% |
| EEER – Indicator of energy efficiency in residential buildings and public facilities | 240 kWh/m2 | 190 kWh/m2 |

## VI 4. SUSTAINABLE AND HEALTH TOURISM

From year to year, tourism increasingly justifies the role of a strategic economic branch, especially given the fact that its total share in GDP is continuously growing (23.6% in 2017 according to the World Travel and Tourism Council), which applies to other indicators as well – the number of tourists, overnight stays and the revenues from this sector. Compared to 2010, revenues and the number of overnight stays increased by 50%. In the period from 2013 to 2017, tourism revenues increased by 44.1%. In 2017, the tourism sector, directly and indirectly, generated over 19% of the total employment. According to the estimates of the World Travel and Tourism Council, as for the next ten-year period, growth of the total contribution of tourism to GDP is expected at an average rate of 3.9% annually. Successful development of tourism has a multiplier effect on other economic sectors – agriculture, construction, trade, transport and other activities.

Improvement of the level of competitiveness on the international tourism market is achieved through the originality / specificity and quality of specific segments of the offer. The characteristics of Montenegro, reflected in a favourable geographical position, i.e. proximity to major European centres, large natural and cultural diversity concentrated in a relatively small area, which provides for the possibility to visit the majority of attractive locations in one day, create the conditions for the tourism product of Montenegro to be attractive for a large number of emitting tourism markets from which people travel all year round.

Tourism is an important instrument of regional cooperation and a strong catalyst for the European integration process. Regional integration in tourism presents the future of development and strengthening of the competitiveness of this economic branch. At the same time, it is a prerequisite for diversification of tourism products, i.e. expansion of the offer, as well as for eliminating the high seasonality in tourism business operations. As for the prospects for the development of tourism in the Western Balkans, the World Tourism Organisation (UNWTO) foresees the continuation of a favourable development tendency in the next 10 years. Long-term programmes of economic stabilisation of the countries of the region have given tourism a prominent role in the overall social and economic development.

The attractiveness of Montenegro is reflected in the fact that the area of only 190km of air distance between the two furthest geographical points of the country accommodates the Mediterranean and continental climate, 40 lakes including the largest lake in the Balkans (Skadar Lake), 2883 plant

species (25% of the European flora at 0.14% of the territory of Europe), five national parks (Durmitor, Prokletije, Bjelasica, Lovćen and Skadar Lake), one rainforest (Biogradska mountain), a river with the deepest canyon in Europe (Tara), and the only fjord in the Mediterranean (Boka Kotorska Bay). This means that tourists can be provided a unique experience thanks to the combination of diverse natural factors such as climate, relief, waterbodies, flora and fauna, which, due to their attractiveness and healing properties, represent a strong encouragement for tourist visits. The beneficial effects of the Mediterranean climate in all seasons, staying at an altitude of 500-1000 meters above sea level and higher, along with favourable, soothing effects on convalescents and people with neuroses, anaemia, respiratory diseases, and allergies, indicate the possibility to optimally use the healing properties of the natural environment in Montenegro (UNESCO).

Montenegro is known as an area rich in religious and cultural-historical sites (Ostrog, Our Lady of Philermos, the hand of John the Baptist, Husein-paša Boljanić's Quran, monasteries and churches, mosques, cathedrals, Roman and Illyrian period monuments, heritage of four Montenegrin dynasties, Njegoš's mausoleum, Kotor as a UNESCO' World Heritage Site, Budva, Risan, Herceg Novi, 40 cultural sites on the Skadar Lake, Svač near Ulcinj).

In a relatively short period of time, health tourism can become one of the leading tourist products of Montenegro, especially given the aforementioned comparative and competitive advantages. The comparative advantages include qualified staff and good reputation of health services, competitive prices, proximity to large emitting markets, natural beauty and favourable climate, country's safety and a long tradition in tourism. In addition, the prices of health care services in Montenegro are relatively low compared to the countries of Western Europe and some Balkan countries, which makes them very competitive. It is important to point out that the Health Insurance Fund of Montenegro has concluded contracts on the provision of health services with 23 European countries. Of particular importance is the fact that the Montenegrin health system advanced for 9 positions in 2017 based on the report of the Euro Health Consumer Index and is ranked as 25$^{th}$ in Europe.

Health tourism is experiencing constant growth and is one of the most promising segments of the global tourist offer. The global medical tourism market will grow at an annual rate of 19% in the next five years. Tourism and health are the main pillars of commitment to sustainable development, and cooperation between the tourism and health sectors in Montenegro makes it possible to achieve a synergistic effect in order to improve health tourism and the all-year-round tourist offer. With its geographical position, numerous natural tourist attractions, abundance of natural wealth, rich cultural heritage and diverse offer in the segment of rehabilitation, prevention, dentistry and aesthetic surgery, Montenegro has all the conditions to become an internationally recognisable destination for health tourism.

**VISION 2024**

Montenegro as an internationally recognised destination for sustainable and health tourism with year-round and diversified tourism offer based on the principles of sustainability, equality, competitiveness, innovation and authenticity.

**SECTORAL GOALS**

| |
|---|
| Development of new and improvement of existing tourism and medical capacities |
| The introduction of innovative technologies and business models in the field of sustainable tourism and health |

**FOCAL AREAS AND TECHNOLOGIES**

EXISTING

- Innovative and standard therapeutic and rehabilitation programmes: for patients with chronic non-communicable diseases, after orthopaedic interventions, neurological patients, athletes, children, treatment and rehabilitation of drug addicts, multidisciplinary diagnostics, dentistry, treatment and rehabilitation of children with autism; products and services of balneotherapy, thalassotherapy, heliotherapy, salt therapy, psamotherapy (sand) aerotherapy and mineral water therapy.
- Application of research of green and smart technologies to the sustainable development of marinas in Montenegro.

*WITH POTENTIAL*

- The use of advanced technologies in oncology (hadron therapy for the treatment of malignant diseases and biomedical research of heavy ions and protons) and the role of Montenegro in the regional project of establishing the South East European International Institute for Sustainable Technologies (SEEIIST);
- Production and development of pharmacotherapy using comparative advantages of Montenegro (healing and aromatic herbs, healing mud, wildlife from the sea);
- Application of nanomaterials in medicine;
- Nutritionism: investment in technologies for the production of medicinal herbs and food products that contribute to health improvement, which, in addition to basic nutritional values, include additional nutraceuticals (natural healthy products, food supplements, functional and fortified foods) and gastronomy (focus is on local identity, food, medicinal factors and knowledge in their application);
- Application of research results from the field of sports to the offer in sports-recreational and wellness tourism.

**RESEARCH AND INNOVATION ENVIRONMENT**

SCIENTIFIC AND EDUCATIONAL INSTITUTIONS

- University of Montenegro, Adriatik University, University of Donja Gorica, Mediteran University, Montenegrin Academy of Sciences and Arts

COMPANIES

- "Dr. Simo Milošević" Institute, "Meljine" General Hospital, hotels and resorts, travel agencies, private health institutions, pharmaceutical companies, ICT companies, IPC Tehnopolis

BUSINESS ASSOCIATIONS

- Chamber of Economy of Montenegro, Montenegrin Employers Federation, Montenegro Business Alliance, Chamber of Physicians of Montenegro, Pharmaceutical Chamber of Montenegro, Dental Chamber of Montenegro, Chamber of Physiotherapists, Health tourism cluster.

PUBLIC INSTITUTIONS

- Ministry of Health, Ministry of Science, Ministry of Sustainable Development and Tourism, Ministry of Education, Ministry of Agriculture and Rural Development, Ministry of Sports, National Tourism Organisation of Montenegro, Local Tourism Organisations of Montenegro, Public Company for Coastal Zone Management, Public Company National Parks, Public Company Ski Resorts of Montenegro, Public Health Institute of Montenegro; Institute for Standardisation of Montenegro, Clinical Centre of Montenegro; Montenegrin Agency for Medicines and Medical Devices; General Hospital "Danilo I" Cetinje; Public Institution for Accommodation, Rehabilitation and Resocialisation of Users of Psychoactive Substances Podgorica; Centre for Autism, Disabilities and Child Psychiatry "Ognjen Rakočević"; Public Pharmaceutical Institution Montefarm, Investment and Development Fund, Secretariat for Development Projects.

CIVIL SECTOR

- Montenegro Tourism Association, Montenegrin Foreign Investors' Council

**Synergistic effect in relation to other priority sectors**

| | **Sustainable and health tourism** |
|---|---|
| **New materials and sustainable technologies** | • Application of nanomaterials in health tourism<br>• Application of mineral raw materials in cosmetology and pharmacy (bentonite and carbonate rocks) |
| **Renewable energy sources and energy efficiency** | • Energy efficiency of tourist and healthcare facilities |
| **Sustainable agriculture and food value chain** | • Production of medicinal herbs, essential oils, cosmetic, spa and other products |
| **ICT** | • E-healthcare services |

| | |
|---|---|
| | o E-health<br>o Health tourism applications<br>o Health information systems<br>o Telemedicine<br>• E-platforms and services of tourist services<br>o E-tourism<br>o E-visitor<br>o Applications using VR/AR<br>• E-Montenegro model for high quality tourism |

**KEY INDICATORS**

| Indicator | 2018 | 2024 |
|---|---|---|
| Direct share of tourism in GDP | 7.6% (2017) | 12% |
| The share of the number of arrivals in medical establishments in relation to the total number of arrivals | 0.9% | 2% |

## VI 5. INFORMATION AND COMMUNICATION TECHNOLOGIES

In Montenegro, information and communication technologies (ICT) have become necessary and present in all other priority areas of development, as well as in all economic and social aspects of life, with an identified growth tendency of the sector. ICT is developing in the context of the improvement of information systems in public administrations, education, industry and health, all in line with modern technological trends and Industry 4.0. concept. ICT infrastructure in Montenegro is at a satisfactory level and is ranked 39th in the world[13], with intensive use of software and ICT services identified. In Montenegro, 98.5% of surveyed enterprises (2018)[14] are using computers in their business, while about 40% of them employ ICT experts, which is a 2.6% growth compared to 2016. When it comes to the Internet, about 80% of enterprises have their web presentation, which is 3.6% more than in 2017.

In recent years, an increasing number of small companies engaged in the development of software and software products have appeared in the IT market, and so have self-employed software engineers, freelancers, digital project managers, digital marketing managers, designers and others, finding engagements in the global IT market. Software engineering has already experienced

[13] The Global Innovation Index 2018
[14] Use of information and communication technologies in Montenegrin companies, 2018 – MONSTAT

significant development and has begun to stand out as a separate economic branch that is not limited to the capabilities of the domestic market. In Montenegro, there are higher education institutions within the state-owned and private universities that produce ICT professionals in the field of software engineering.

As for the "C" segment of ICT, it is dominated by three international operators of fixed and mobile telephony, which provide modern communication services to mobile cellular networks, optical communication systems and DSL subscriber lines. The existence of modern telecommunication infrastructure is the basis for the development of many other economic areas and the entire society.

**VISION 2024**

Digital Montenegro with the use of advanced ICT solutions in all sectors of the economy and developed IT awareness that enables a dynamic and proactive access to new and innovative technologies.

**SECTORAL GOALS**

| |
|---|
| Development of e-infrastructure and entrepreneurship |
| Promotion of digital economy |

**FOCAL AREAS AND TECHNOLOGIES**

EXISTING

- Telecommunications
- Software engineering

WITH POTENTIAL

- New generation communication technologies (5G, SDN, NFV, GNSS, etc.)
- IoT (Internet of things)
- Virtual reality, augmented reality (VR/AR), 3D
- Digital transformation (ERP systems, e-commerce, financial technologies, etc.)
- Blockchain technology and cryptocurrency
- Big Data, Cloud – services
- Video games as a support model for other sectors
- Security of information systems
- Smart technologies (cities, buildings, etc.)
- Green ICT (emission reduction, energy saving, etc.)
- Machine learning and artificial intelligence

**RESEARCH AND INNOVATION ENVIRONMENT**

SCIENTIFIC AND EDUCATIONAL INSTITUTIONS

- Montenegrin Academy of Sciences and Arts, University of Montenegro, University of Donja Gorica, Mediteran University, Adriatik University

COMPANIES

- Three large telecom operators, as well as about 40 larger, small and medium-sized enterprises, an ICT accelerator and Innovation and Entrepreneurship Centre Tehnopolis have been identified.

BUSINESS ASSOCIATIONS

- Chamber of Economy of Montenegro, Montenegrin Employers Federation, Montenegro Business Alliance, Association of Managers of Montenegro.

PUBLIC INSTITUTIONS

- Ministry of Economy, Ministry of Science, Ministry of Public Administration, and the Ministry of Education.

CIVIL SECTOR

- Science Promotion Foundation (Prona), Montenegrin Association for New Technologies MANT, ITd, Digitalizuj.me, Internet Society Montenegro (ISOC.me).

**Synergistic effect in relation to other priority sectors**

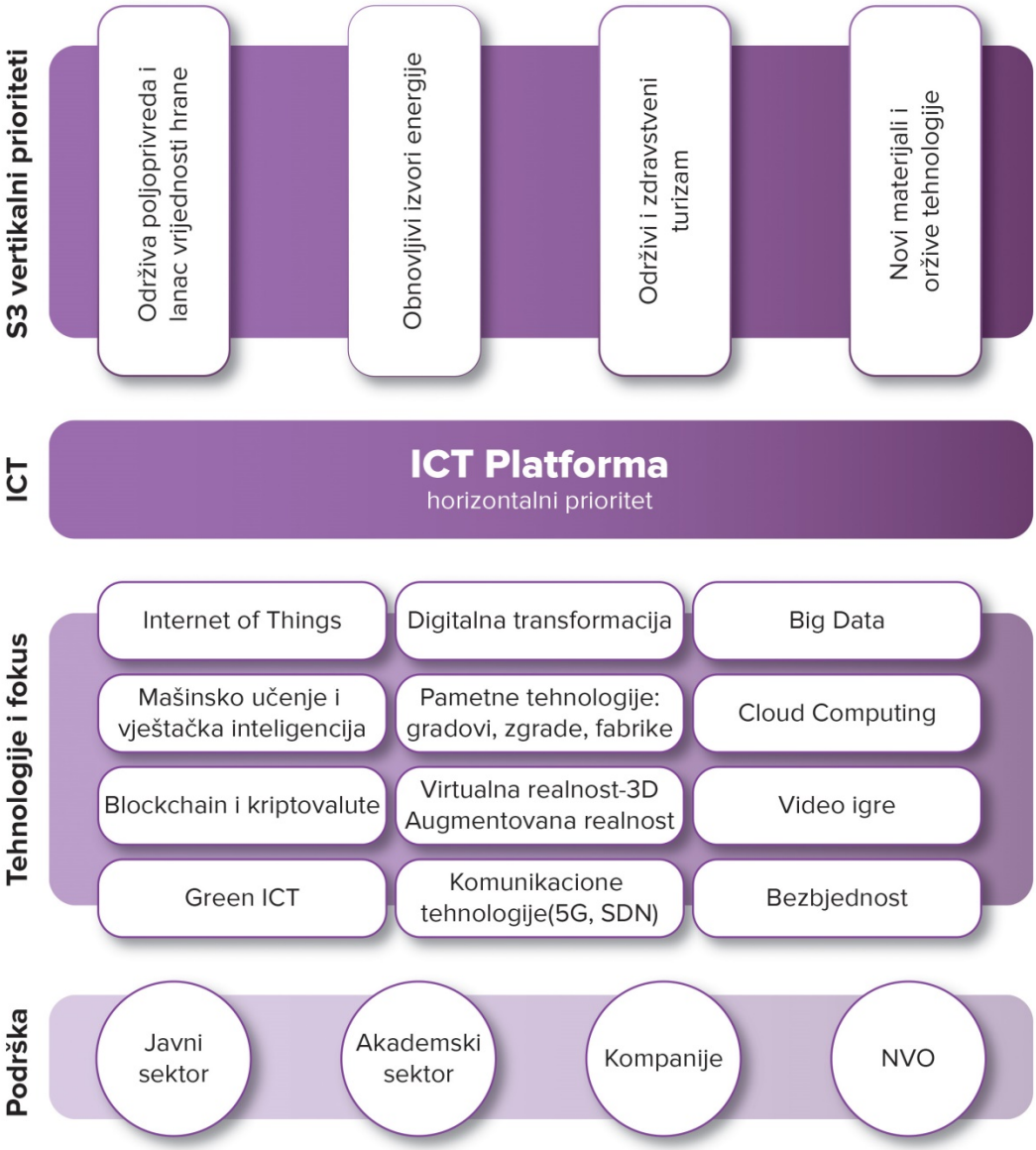
| | **ICT**<br>**(horizontal priority sector)** |
|---|---|
| **Sustainable agriculture and food value chain** | • Smart and efficient management of agriculture<br>• Use of sensors for monitoring production, storing and transport of healthy food and the environment (bio-sensors, smart buoy, smart bee hive, etc.)<br>• Centre of Excellence BIO-ICT |
| **Renewable energy sources and energy efficiency** | • Optimum management of the electrical energy systems and networks<br>• Energy and data transmission<br>• Managing data for smart use of energy sources or engaging network capacities<br>• Cyber security<br>• Smart energy systems – smart energy and information transportation<br>• Smart trade and electrical energy management – energy market<br>• Management of data on energy research on the state of affairs and potential in energy<br>• Development of a business intelligence system in energy<br>Green ICT |
| **Sustainable and health tourism** | • E-healthcare services<br>o E-health<br>o Health tourism applications |

| | |
|---|---|
| | o Health information systems<br>o Telemedicine<br>• E-platforms and services of tourist services<br>o E-tourism<br>o E-visitor<br>o Applications that use VR/AR<br>o e-Montenegro model for high tourism |
| **New materials and sustainable technologies** | • Efficient management of production facilities using the ICT<br>• Smart houses and smart cities |

**KEY INDICATORS**

| **Indicator** | **2018** | **2024** |
|---|---|---|
| ICT share in GDP | 4.2% (2016) | 11% |
| Percentage of users having broadband internet access (30Mb / s or more) | 46.13%[15] | 70% |

[15] Source: Agency for Electronic Communications and Postal Services


S3 vertikalni prioriteti
Održiva poljoprivreda i lanac vrijednosti hrane
Obnovljivi izvori energije
Održivi i zdravstveni turizam
Novi materijali i oržive tehnologije
ICT
ICT Platforma
horizontalni prioritet
Tehnologije i fokus
Internet of Things
Digitalna transformacija
Big Data
Mašinsko učenje i vještačka inteligencija
Pametne tehnologije: gradovi, zgrade, fabrike
Cloud Computing
Blockchain i kriptovalute
Virtualna realnost-3D Augmentovana realnost
Video igre
Green ICT
Komunikacione tehnologije(5G, SDN)
Bezbjednost
Podrška
Javni sektor
Akademski sektor
Kompanije
NVO

# VII COMBINATION OF DEVELOPMENT POLICIES AND FINANCIAL FRAMEWORK

The S3 implementation, as well as the process of drafting the Strategy, have implied the involvement of a large number of key actors responsible for defining and implementing development policies related to research and innovation activities. These policies included industrial policy, human resources development policy, entrepreneurship promotion policy, digitisation policy, agricultural development policy, energy policy, tourism policy, environmental protection policy, etc.

The identified thematic priorities will be provided financial support from both the state budget, and from other available funds. Investing in research and innovation strengthens the existing production and technological capacity and creates many opportunities in the framework of new developments directions in the economy, stimulating competitiveness and the creation of highly qualified jobs. In this regard, the scientific research system and the innovation system need to be enhanced so as to contribute to the knowledge-based economy.

The S3 Strategy has identified the basic common goals of development policies, determined by the interests related to research and innovation activity, and these are:

1. Strengthening cooperation between the academic and economic sector;
2. Improving access to international knowledge centres;
3. Strengthening human resources in the field of research and innovation;
4. Strengthening the public research system;
5. Support to innovative activities in the private sector.

## VII 1. Enhancing the cooperation between the academic and economic sectors

The public and the economic sector should engage more in creating an environment suitable for the development of research and innovation that corresponds to their needs. This can be achieved by providing the necessary support to research and innovation activity, as well as by integrating it into regular business operations. Creating an efficient innovation eco-system will be implemented by improving the national research and innovation infrastructure through the establishment of the Science and Technology Park and development of centres of excellence, which will enable stimulation of innovations and development of new technologies.

Exchange of knowledge between the academic and the economic sector and the use of innovative solutions will be stimulated through the establishment of a *Technology Transfer Centre* and an accompanying platform, with a view to support technologically oriented companies for the implementation of existing modern technologies, as well as for development of new technologies and their commercialisation.

As for the support to creation of specific innovations, through collaboration between the academic and the economic sector, the greatest attention should be paid to the implementation of: a) grants for support to development of innovation in companies, and b) large collaborative grants for innovative projects to create new products, services and technologies.

With a view to better protection of intellectual property and its economic cost-efficiency, it is necessary to work on further improvement of the legal and institutional framework in the field,

providing for adequate support programmes for protection of all forms of intellectual property, especially patents.

### VII 2. Enhancing access to international knowledge centres

Encouraging and referring the scientific research community to access international knowledge centres, research and innovative programmes, projects and initiatives, is facilitated by concluding bilateral and multilateral agreements in the field of research and innovation. Cooperation under these agreements needs to be intensified and expanded through conclusion of agreements with new independent partners.

Through membership in EU funds and a number of programmes (COST, H2020, COSME, EUREKA, ERASMUS+), Montenegro's integration into the European Research Area (ERA) is fostered and cooperation is enabled with international scientific teams of excellence, so the state should continue to support this type of international integration in the field of science strongly. In addition, larger institutional programmes need to be developed that will enable the involvement of scientific diaspora in the national innovation ecosystem and economic development in general, which would provide for utilisation of their knowledge and experience as a valuable national resource.

Promoting and enhancing the national system of research and innovation should be continued and strengthened through support to the participation of domestic scientific research community at international conferences and by encouraging the publication of research papers in open access journals.

Regardless of the aforementioned commitments related to the improvement of national access to international knowledge centres, Montenegro identifies an exceptional development opportunity on this basis within the framework of the regional initiative for the establishment of the South East European International Institute for Sustainable Technologies (SEEIIST). SEIIST foresees the realisation of the most modern hadron cancer therapy in parallel with research in biomedicine, which will make it unique in the world (50: 50% of utilization of working capacity between therapy and research). At the time of commissioning, SEEIIST would be the most up-to-date infrastructure of its kind globally. The Institute will provide the founding countries with preferential conditions for using the large research infrastructure for multidisciplinary research, innovations and practical application of knowledge (treatment). This is an exceptional opportunity for Montenegro, where the initiative to establish the Institute was born, to realise a direct access to the state-of-the-art knowledge centre that promotes scientific excellence and economic development based on innovative high-tech products, and thus raises the international competitiveness of national and regional research groups, research and consequently the economy. SEIIST can achieve this by transferring cutting-edge technology to domestic industry, which is crucial for the SME sector, as well as through the development of regional digital networking, inter-agency cooperation and the joint use of EU funds. For the above reasons, every effort will be made at the national level to ensure SEIIST is realised and to provide for the most favourable conditions for attracting the establishment of this infrastructure in Montenegro.

### VII 3. Strengthening human resources in the field of research and innovation

Human resources as research and innovative capacities are crucial for the successful implementation of the S3 in Montenegro, as they are the driver of the state's economic and social development. Accordingly, they need to be strengthened in a proper way.

Strengthening the capacities of the research community, particularly of young personnel, needs to be achieved by encouraging their excellence through scholarships for doctoral research, employment within the framework of scientific research projects, and by providing scientific and innovative awards for excellence. The employment programmes for PhD students, PhD degree holders and students of postdoctoral studies, primarily in the economic sector, will stimulate the transfer of knowledge and enable the acquisition of practical knowledge that will strengthen the innovation capacities of enterprises. In this way, development and research in the economic sector will be promoted, which will contribute to a more dynamic development of the knowledge-based economy.

Access to international knowledge centres and large research infrastructures (CERN, EMBL, EMBO, ICGEB, etc.), which has been provided to young researchers under bilateral and multilateral agreements and membership in international organisations, should be supported, intensified and expanded by the implementation of new arrangements that enable further internationalisation and networking. In this context, special attention will be paid to young researchers returning to the country after internationalisation, i.e. training or work in prestigious world centres of science and innovation, in order to transfer their knowledge and experience to the national innovation system. This intention should be realised by creating opportunities for engaging this highly skilled staff, primarily within the centres of excellence that can contribute to the international recognition of national research capacities in the priority areas of S3.

In addition to these measures, the constant promotion of the researcher profession and its affirmation in society will be insisted upon, in order to attract as many talents as possible into the profession, as well as to restore the confidence of the economy in the national human resources and to attract investments from this sector. All these measures will enable the creation of a critical mass of national researchers capable of integrating into international, innovative and commercial research flows.

A special opportunity for stimulating excellence and strengthening human resources in Montenegro lies with the SEEIIST initiative. Through education and professional development of young scientists and engineers using the state-of-the-art laboratory equipment and exchange of experience with renowned experts hired by the Institute, SEEIIST can address the problem of "outflow of talents", as one of the biggest problems in the region. The Institute will generate around 1000 high-tech jobs (for scientists, physicians, engineers and technical staff), given that along with the treatment of about 500 patients annually, half the working capacity (time) will be dedicated to research, especially in biomedicine, which will give an immeasurable contribution to the improvement of health care in the region.

### VII 4. Strengthening the public research system

In order for the scientific research and innovation capacities to be increased and used adequately, it is necessary to define and implement a model for enhancing the national research infrastructure and an open access to it. In this context, investments should be made in the existing and creation of new laboratories, as well as in the procurement of necessary equipment meeting the most modern technological standards. At the same time, open access needs to be provided for interested researchers to the research equipment in the possession of scientific research institutions, under clearly determined open-access professional standards and policy (programmes) that need to be defined. This policy should also enable researchers to access scientific research literature, international publications, scientific databases and research-academic networks, so that they can use the latest worldwide literature and trends in science in a high-quality manner.

### VII 5. Support to innovative activities in the private sector

In a society based on knowledge and innovation, innovative companies take up a prominent place, as they represent the most dynamic and most significant development potential of a modern economy. By encouraging innovations in the economic sector, through the development of new products and introduction of new and enhanced technologies and models of work process organisation, better business efficiency and competitiveness are provided in the national and international markets. The implementation of financial support programmes through the grant allocation for improving innovation needs to contribute to strengthening of the innovative potential of companies, stimulating the application of innovative ideas and technologies. In this manner, the investments of the economic sector in research and development based on own innovations are encouraged at the same time.

Particular support will be directed at the development of incubators and accelerators in order to facilitate the establishment of start-up and spin-off companies. In this context, programmes for providing advisory services and trainings aimed at supporting innovative entrepreneurship will be organised. Programmes will also be implemented for attracting investments from the financial and private sectors in the form of venture capital in start-up and other innovative companies. A more welcoming environment for innovative entrepreneurship will generally be provided through an innovated fiscal policy with tax incentives for investments in innovation and favourable customs treatment of equipment and materials intended for research.

### VII 6. Financial framework

For the period from 2018 to 2024, the Smart Specialisation Strategy will serve as the foundation for investments in research, innovation and development (Table 7). In this period, investments in the amount of EUR 114.5 million are planned. Of the total planned funds, EUR 75.3 million will be provided from the budget, while the private sector investments are projected at EUR 25 million. Around EUR 12 million is expected from the EU funds, with around EUR 2 million expected from other international organisations and programmes. The plan is to allocate the majority of these funds to development and research and innovation projects in the identified priority areas of the S3.

**Table 7 – S3 Financial framework (2018–2024)**

| Development policies | Source of financing | Institutions | Period 2018-2024 | Annual average |
|---|---|---|---|---|
| | | | | |
| Strengthening cooperation between academic and economic sector | **Montenegro** | Ministry of science | 8,520,000 | **4,528,333** |
| | | Ministry of Economy | 2,520,000 | |
| | | Other ministries | 4,000,000 | |
| | | Capital budget | 8,450,000 | |
| | **EU** | IPA | 680,000 | |
| | | EU framework programmes | 3,000,000 | |
| | | | **27,170,000** | |
| Improving access to international knowledge centres | **Montenegro** | Ministry of science | 17,910,000 | **3,685,000** |
| | | | | |
| | **EU** | IPA<br>ERASMUS+ | 3,900,000<br>300,000 | |
| | | | **22,110,000** | |
| Strengthening human resources in the field of research and innovation | **Montenegro** | Ministry of science | 6,213,000 | **1,688,333** |
| | | Ministry of Education | 2,000,000 | |
| | **EU** | IPA | 1,117,000 | |
| | | EU framework programmes | 500,000 | |
| | | ERASMUS+ | 300,000 | |
| | | | **10,130,000** | |
| Strengthening the public research system | **Montenegro** | Ministry of science | 5,420,000 | **1,403,333** |
| | **EU** | IPA | 1,000,000 | |
| | **International organisations and programmes** | | 2,000,000 | |
| | | | **8,420,000** | |
| | | Ministry of science | 13,200,000 | |

| | | | | |
|---|---|---|---|---|
| Support to innovative activities in the private sector | **Montenegro** | Ministry of Economy | 1,086,000 | **3,597,667** |
| | | IDF | 6,000,000 | |
| | **EU** | IPA | 300,000 | |
| | | EU framework programmes | 1,000,000 | |
| | | | **21,586,000** | |
| Total private sector investments | **Montenegro** | 25% of the total investment in research and innovations | **25,106,333** | **4,184,389** |
| | | | | |
| **Total for** Montenegro | | | **75,319,000** | **12,553,167** |
| **Total for** EU | | | **12,097,000** | **2,016,167** |
| **Total** for international organisations and programmes | | | **2,000,000** | **333,333** |
| **Total** for private sector | | | **25,106,333** | **4,184,389** |

| | | | | |
|---|---|---|---|---|
| **GRAND TOTAL** | | | **114,522,333** | **19,087,056** |

# VIII MONITORING AND EVALUATION

Particularly important for the successful implementation of the Smart Specialisation Strategy are the implementation control mechanisms. For this purpose, the *Tentative Monitoring Plan* (Table 8) has been prepared for monitoring the accomplishment of the set goals and activities. The indicative amounts of funds necessary for implementation of all planned programmes and projects are presented in the S3 Financial Framework (Table 7).

Given that the implementation and monitoring process is a multi-stage and participatory mechanism that implies the active participation of a large number of public sector entities, the implementation of the Smart Specialisation Strategy will take place on the basis of the *Action Plan for Implementation*, which will be adopted separately in the coming period. The Action Plan will define in detail all the relevant elements in relation to the S3 Tentative Monitoring Plan (priorities, objectives, measures and activities, indicators, deadlines for implementation), and in particular the funds needed for the implementation of individual measures, as well as their sources (distributed primarily by the proponents of individual activities).

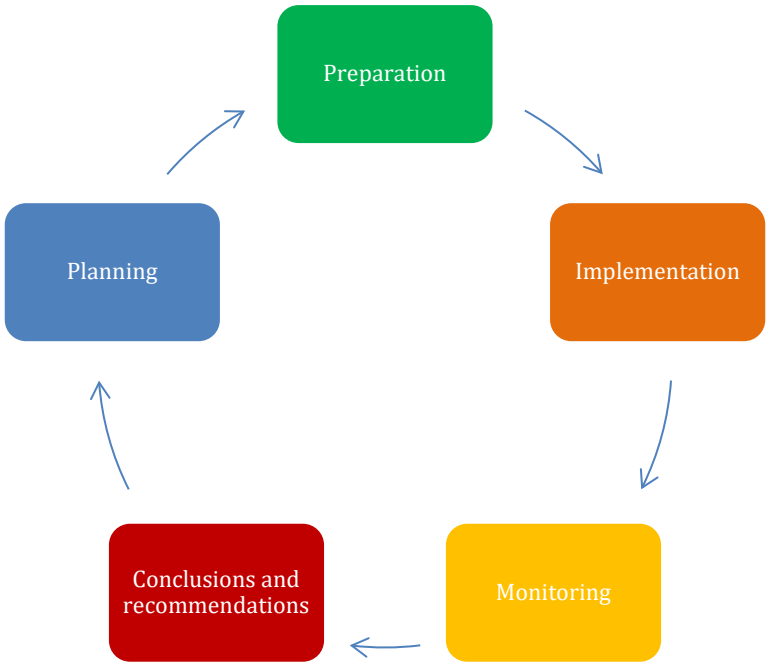



Figure 10 – Continuous process of S3 monitoring and improvement

A special segment of monitoring the success of the implementation of the S3 Strategy will be an evaluation that will look at its relevance, efficiency and impact of the defined measures on achieving strategic goals. The evaluation process will bring *Conclusions on the Success of Implementation*, with *Recommendations for Changing and Improving Planning* (Figure 10).

The National Office for Smart Specialisation will work at the operational level and will be responsible for the implementation, monitoring and evaluation. The S3 strategic group,

representatives of relevant ministries and S3 focus groups will support the monitoring and evaluation system.

S3 monitoring and evaluation will be based on the quantified goals identified through the various stages of the Strategy's preparation and the Entrepreneurial Discovery Process. Measurable S3 indicators have been identified in Table 8. Indicators at the level of the implementation area will in some cases be modified and, where necessary, revised in the preparation of the Action Plan.

In the process of Action Plan monitoring, data will be collected on the realisation of individual activities and projects of the competent institutions, as well as on the achievement of the objectives, i.e. the results and the performance indicators, which will form the basis for the *Annual Implementation Reports*. In this way, it will be possible to measure the success or identify problems, or gaps in the implementation of the Strategy. The monitoring process will also serve as a basis for the potential introduction and implementation of additional measures needed to achieve the successful implementation of the S3. The annual reports will be prepared by the National Office for Smart Specialisation, in the first quarter of the year for the previous year.

Based on the:
• results of S3 implementation reflected through monitoring reports;
• evaluation of the effectiveness of the system of measures established by the S3; and
• results of a continuous EDP process (periodic consultation of interested economic entities and associations),

it will be possible to revise the S3, even before the end of the period for which it has been adopted, if and when this is necessary. The S3 strategic group is in charge of the S3 revision process, in cooperation with the Ministry of Science.

| Strategic objectives | Specific objectives | Development policy instruments | Priority area* | Output indicators | Reporting | Result indicators | Reporting |
|---|---|---|---|---|---|---|---|
| Strengthening cooperation between academic and economic sector | Creating an attractive environment for innovations | Centres of excellence | ICT, SAFVC, SHT | The number of researchers engaged in centres of excellence | Annual | The number of new academic-business initiatives (project proposals, service contracts, etc.) arising through interaction | Biennial |
| | | Science and Technology Park | RESEE, NMST, ICT, SHT | The number of enterprises – tenants in STP<br><br>The number of users of services in STP | Annual | The number of new innovative initiatives and enterprises | Biennial |
| | | Programme of encouraging cluster development in Montenegro | RESEE, NMST, ICT, SHT, SAFVC | The number of clusters per sector (SMEs, institutions of the Government, universities, private associations) | Annual | The number of members of clusters per sector<br>The number of new products and services | Biennial |
| | | Programme of increasing regional and local competitiveness through alignment with the requirements of international business standards | RESEE, NMST, ICT, SHT, SAFVC | The number of SMEs implementing the standards | Annual | The number of / percentage of standardised products and services, organisation processes and systems | Biennial |
| | Improving exchange of knowledge and strengthening innovation potential | Office for Technology Transfer | RESEE, NMST, ICT, SHT, SAFVC | The number of enterprises included in TT | Annual | The number of licences (patents or copyrights) | Annual |
| | | Establishing a platform for technology transfer | RESEE, NMST, ICT, SHT, SAFVC | The number of research groups within the S3 priority areas in the platform | Annual | The number of newly established academic spin-off enterprises | Biennial |
| | | Programme of improving innovativeness in SMEs | RESEE, NMST, ICT, SHT, SAFVC | The number of supported enterprises | Annual | The number of research/innovation contracts of enterprises with consultants (universities, public research organisations) | Annual |
| | | Small-scale projects for technology evaluation | | The number of financed projects | Annual | The number of prototypes, concepts substantiated with evidence and pilot products | Biennial |
| | Strengthening innovative activities through collaboration | Grants for collaborative applied research and innovation projects | RESEE, NMST, ICT, SHT, SAFVC | The number of financed projects | Annual | The number of developed innovative products, services or processes | Biennial |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Improving the protection of intellectual property rights | Revision and amendments to the legal framework and infrastructure for intellectual property rights | RESEE, NMST, ICT, SHT, SAFVC | Percentage of compliance of the legal framework for intellectual property rights | Annual | The number of protected patents and other intellectual property rights | Annual |
| | | Co-financing patent costs | | The number of co-financed patent applications | Annual | The number of protected patents | Annual |
| Improving access to international knowledge centres | Ensuring and expanding access to international research projects, initiatives and infrastructures | Involvement in bilateral and multilateral research and innovation agreements | RESEE, NMST, ICT, SHT, SAFVC | The number of financed projects | Annual | The number of joint publications with researchers from partner institutions | Biennial |
| | | SEEIIST | SHT | The number of researchers engaged in bilateral and multilateral projects | Annual | The number of papers in the top 10% of most cited publications and journals | Biennial |
| | | Grants for mobility of young researchers and entrepreneurs | RESEE, NMST, ICT, SHT, SAFVC | The number of persons-days spent in mobility | Annual | The number of bilateral and multilateral projects and partnerships | Biennial |
| | | Mobility of researchers and professors | RESEE, NMST, ICT, SHT, SAFVC | The number of researchers and professors engaged in new institutions and projects | Annual | The number of joint publications and implemented projects | Biennial |
| | Enhancing participation in the international scientific and innovation activities | Providing technical support for project applications in H2020/HEU | RESEE, NMST, ICT, SHT, SAFVC | The number of project applications that received technical support for participation in the EU Framework Programme for Research and Innovations | Annual | Success rate of applications (%) in the EU Framework Programme for Research and Innovations | Biennial |
| | | Providing additional or targeted grants for participation in international competitive research and innovation programmes | RESEE, NMST, ICT, SHT, SAFVC | The number of participants in projects of the EU Framework Programme for Research and Innovations for which additional national financing was provided | Annual | The number of projects in which Montenegro is a coordinator<br>The number of projects in which Montenegro is a partner | Biennial<br>Biennial |
| | | Using the national centres of European | RESEE, NMST, ICT, SHT, SAFVC | The number of trained NCPs | Annual | Success of our participation in the projects within the EU Framework Programme for Research and Innovations (%) | Biennial |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | networks (NCPs, EEN) Active promotion of participation and integration in international networks (info days, workshops, seminars) | | The number of promotional events | Annual | The number of participants in promotional events | Biennial |
| | Involving Montenegrin scientific diaspora in the national innovation system | Expanding and maintaining the global network of Montenegrin researchers Providing the opportunities for incoming mobility to acquire international knowledge from diaspora researchers | RESEE, NMST, ICT, SHT, SAFVC | The number of researchers from diaspora in the network | Annual | The number of joint activities of researchers from Montenegro and the diaspora | Biennial |
| | | | | The number of persons-days spent in Montenegro by diaspora researchers (classified per activity) | Annual | The number of joint publications<br><br>The number of jointly applied projects<br><br>The number of implemented projects | Biennial |
| | Promoting national research and innovation system | Supporting the organisation of international scientific conferences and participation in them | RESEE, NMST, ICT, SHT, SAFVC | The number of researchers in conferences organised in Montenegro | Annual | The number of citations per cited publication | Biennial |
| | | Promoting open-access publications | | The number of researchers supported to take part in conferences abroad | | The number of citations per publication | Biennial |
| | | | | The number of financially supported open-access publications | | The number of citations per publication and the number of users of results of the published research | Biennial |
| Strengthening the public research system | Ensuring stable financing for public applied research | Grants for applied research | RESEE, NMST, ICT, SHT, SAFVC | The number of financed projects | Annual | The number of new innovative products, service or processes and the number of patented applications | Biennial |
| | Strengthening research infrastructure | Research and innovation infrastructure | RESEE, NMST, ICT, SHT, SAFVC | The number of new research and innovation laboratories or upgraded existing ones | Annual | The number of Montenegrin publications in the top 10% of the most cited publications worldwide per area | Biennial |
| | | Research and innovation equipment | | The number of acquired new pieces of equipment | Annual | The number of new research and commercial services | Biennial |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Presentation of the legal framework for research infrastructure open access | | The number of researchers using infrastructure through open access | Annual | Percentage of research and innovation capacities used through open access | Annual |
| | Providing advanced services to the research community | Providing access to scientific literature and data sources | RESEE, NMST, ICT, SHT, SAFVC | The number of researchers using scientific literature | Annual | The number of publications | Biennial |
| | | Supporting ICT services of Montenegrin scientific network | | The number of accesses to the database of scientific literature | Annual | The number of publications | Biennial |
| | | Supporting MREN (Montenegrin Research and Education Network) | | The number of registered researchers | Annual | The number of collaborative research projects | Biennial |
| | | | | MREN network bandwidth | Annual | The number of published papers<br>The number of citations | Biennial |
| Support to innovative activities in the private sector | Using R&D&I investments from the private sector | Grants for innovative projects<br>Grants for research projects | RESEE, NMST, ICT, SHT, SAFVC | The number of financed projects | Annual | The number of innovative products / services, processes, organisation and marketing systems | Biennial |
| | | Tax incentives for R&D | | The number of financed projects | Annual | The number of published papers | Biennial |
| | | Support programme for modernisation of manufacturing industry – credit support for procurement of equipment | | | | The number of citations | |
| | | | | The number of enterprises which exercised the right to tax incentives | Annual | Total spending of business-economic sector on R&D&I | Biennial |
| | | Support programme for modernisation of manufacturing industry - subventions for procurement of equipment | | The number of enterprises which received loans | Annual | The number of innovative products and processes | Biennial |
| | | | | The number of enterprises which received a subvention | Annual | The number of innovative products and processes | Biennial |
| | Support to development of the economy based on innovat | ENIF fund for innovative enterprises (WB EDIF-ENIF) | RESEE, NMST, ICT, SHT, SAFVC | The number of enterprises financed through investments into capital (for initial and development phase) | Annual | The number of innovative services, processes and products | Biennial |
| | | Incubators | | The number of new incubators | Annual | The number of newly established enterprises | Biennial |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | ive activities | | | | | | |
| | | | | | | The number of sustainable enterprises which have their own market | Biennial |
| | | Accelerators | | The number of new accelerators | Annual | The number of enterprises which received support | Biennial |
| | | | | | | The number of enterprises which received support | Biennial |
| | | | | | | The number of high-tech enterprises which increased the number of employees | Biennial |
| | | | | | | The number of enterprises which improved their business operations | Biennial |
| | | Awareness raising and providing trainings on innovation and entrepreneurship | | The number of organised trainings on innovations and entrepreneurship | | The number of persons who completed a training on innovations and entrepreneurship | Biennial |
| | | | | The number of organised marketing campaigns | | Percentage of awareness of information on programmes of support to innovation activities (survey) | Biennial |
| | | | | | | Percentage of trust in innovative entrepreneurship (survey) | Biennial |
| Strengthening human resources in the field of research and innovation | Expanding scientific community | Programmes for employment of doctors of science in the economic sector and higher education institutions | RESEE, NMST, ICT, SHT, SAFVC | The number of supported doctors of science | Annual | The number of doctors of science employed after a 12-month period | Biennial |
| | | Providing for high quality of master and doctoral study programmes | | The number of accredited programmes | Annual | Better position of national universities in international ranking lists | Biennial |
| | | Strengthening doctoral study programmes | | The number of new doctoral programmes | Annual | The number of doctors of science | Biennial |
| | | Co-financing doctoral studies | | The number of co-financed doctors of science | Annual | The number of new doctors of science | Biennial |
| | | Scholarships for doctoral students | | The number of awarded scholarships for doctoral students | Annual | The number of new young doctors of science | Biennial |

Table 8 – Tentative monitoring plan

*NMST – New Materials and Sustainable Technologies; SAFVC – Sustainable Agriculture and Food Value Chain; RESEE – Renewable Energy Sources and Energy Efficiency; SHT – Sustainable and Health Tourism; ICT – Information and Communication Technologies

# IX ANNEX

## Table 1. Mapping of economic potential: results

| NACE | Sector | Specialisation LQ above 1.5 | Employment share above the common threshold of 1% | Employment share above industry size specific threshold | Employment share above industry specific size threshold | Employment growth above 25% | Wages relative to average wages higher than 125% | Traded clusters / emerging industries | Export specialisation | Priority sector |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 012 | Growing of perennial plants | × | × | × | 0.68% | -4.1% | 169.2% | -- | -- | Agriculture and food |
| 052 | Mining of lignite | 24.64 | 0.88% | 0.88% | 0.57% | 3.2% | 146.0% | -- | -- | -- |
| 101 | Processing and preserving of meat and meat products | 0.41 | 0.32% | 0.32% | 0.21% | 73.6% | 58.3% | Blue Growth Industries | Yes | Agriculture and food; Manufacturing |
| 110 | Manufacture of drinks | 1.18 | 0.42% | 0.42% | 0.28% | 1.1% | 168.8% | -- | Yes | Agriculture and food; Manufacturing |
| 161 | Sawmilling and planing of wood | 4.64 | 0.90% | 0.90% | 0.59% | 1.7% | 50.7% | -- | -- | Manufacturing |
| 162 | Manufacture of wood products, manufacture of articles of cork, straw and plaiting materials | 0.50 | 0.27% | 0.27% | 0.18% | 50.4% | 45.8% | Environmental Industries | -- | Manufacturing |
| 212 | Manufacture of pharmaceutical preparations | 0.51 | 0.22% | 0.22% | 0.14% | -23.6% | 130.4% | -- | Yes | Manufacturing; Medicine and human health |
| 241 | Manufacture of basic iron and steel and ferro alloys | 1.61 | 0.47% | 0.47% | 0.31% | -81.9% | 91.0% | Environmental Industries | Yes | Manufacturing |
| 244 | Precious metal production and other ferrous metal production | 5.00 | 0.86% | 0.86% | 0.56% | -66.8% | 161.0% | -- | -- | Manufacturing |
| 351 | Production, transmission and distribution of electricity | 3.27 | 2.55% | 2.55% | 1.66% | -6.0% | 180.2% | Production and transmission of electricity; Blue Growth Industries; Environmental Industries | Yes | Energy |
| 360 | Water collection, treatment and supply | 5.56 | 1.87% | 1.87% | 1.22% | 7.6% | 99.2% | Services related to environment; Blue Growth Industries; Environmental Industries | -- | -- |
| 390 | Remediation activities and other waste management services | 78.46 | 1.96% | 1.96% | 1.28% | -35.1% | 87.3% | -- | -- | -- |

| NACE | Sector | Specialisation LQ above 1.5 | Employment share above the common threshold of 1% | Employment share above industry size specific threshold | Employment share above industry specific size threshold | Employment growth above 25% | Wages relative to average wages higher than 125% | Traded clusters / emerging industries | Export specialisation | Priority sector |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 412 | Construction of residential and non-residential buildings | 1.64 | 3.55% | 3.55% | 2.32% | 9.3% | 78.3% | -- | -- | Construction industry |
| 421 | Construction of roads and railways | 1.23 | 0.81% | 0.81% | 0.53% | 36.3% | 108.0% | -- | -- | Transport, Construction industry |
| 432 | Construction installation | 0.31 | 0.74% | 0.74% | 0.48% | 76.7% | 68.8% | -- | -- | Construction industry |
| 433 | Building completion works | 0.58 | 0.80% | 0.80% | 0.52% | 41.0% | 55.0% | -- | -- | Construction industry |
| 461 | Wholesale for a commission | 2.78 | 1.27% | 1.27% | 0.83% | 10.0% | 59.0% | Distribution and electronic trade; Experience Industries; Blue Growth Industries | -- | -- |
| 469 | Non-specialized wholesale trade | 17.94 | 9.20% | 9.20% | 5.99% | -12.1% | 64.6% | -- | -- | -- |
| 491 | Passenger rail transport, interurban | 3.48 | 1.19% | 1.19% | 0.78% | 19.8% | 89.8% | -- | -- | Transport |
| 494 | Freight transport by road and removal services | 0.47 | 1.05% | 1.05% | 0.69% | 58.2% | 51.9% | Transportation and logistics; Blue Growth Industries | -- | Transport |
| 522 | Service activities incidental to transportation | 1.52 | 2.83% | 2.83% | 1.84% | 1.9% | 127.0% | Transportation and logistics; Experience Industries; Blue Growth Industries; Environmental Industries | -- | Transport |
| 551 | Hotels and similar accommodation | 2.95 | 4.90% | 4.90% | 3.19% | -2.6% | 85.9% | Hospitality and Tourism; Experience Industries | Yes | Tourism |
| 561 | Restaurants and mobile food service activities | 1.11 | 4.09% | 4.09% | 2.67% | 47.7% | 42.1% | -- | -- | Tourism |
| 563 | Beverage preparing and serving activities | 2.20 | 2.78% | 2.78% | 1.81% | 8.2% | 46.8% | -- | -- | -- |
| 602 | Television programming and broadcasting activities | 5.87 | 0.93% | 0.93% | 0.61% | -1.1% | 98.9% | -- | -- | ICT |
| 611 | Wired telecommunication activities | 2.59 | 1.10% | 1.10% | 0.72% | -20.0% | 220.8% | -- | -- | ICT |
| 619 | Other telecommunication activities | 2.27 | 0.55% | 0.55% | 0.36% | -10.9% | 190.4% | -- | -- | ICT |
| 620 | Computer programming, consultancy and related activities | 0.24 | 0.56% | 0.56% | 0.36% | 116.6% | 88.8% | Business services; Experience Industries; Creative Industries | -- | ICT |

| NACE | Sector | Specialisation LQ above 1.5 | Employment share above the common threshold of 1% | Employment share above industry size specific threshold | Employment share above industry specific size threshold | Employment growth above 25% | Wages relative to average wages higher than 125% | Traded clusters / emerging industries | Export specialisation | Priority sector |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 641 | Monetary intermediation | × | × | × | 1.55% | 6.2% | 214.6% | -- | -- | Financial services |
| 649 | Other financial service activities, except insurance and pension funding | × | × | × | 0.34% | -9.2% | 137.2% | -- | -- | Financial services |
| 651 | Insurance | × | × | × | 0.42% | 60.3% | 126.7% | -- | -- | Financial services |
| 683 | Management of real estate on a fee or contract basis | 1.22 | 0.86% | 0.86% | 0.56% | 7.9% | 138.9% | -- | -- | -- |
| 691 | Legal activities | 0.88 | 0.69% | 0.69% | 0.45% | 112.2% | 41.5% | -- | -- | -- |
| 702 | Management consultancy activities | 1.60 | 1.78% | 1.78% | 1.16% | -34.6% | 74.9% | Experience Industries; Creative Industries | -- | -- |
| 711 | Architectural and engineering activities and technical consultancy | 0.46 | 0.75% | 0.75% | 0.49% | 262.0% | 67.4% | Business services; Blue Growth Industries; Creative Industries | -- | -- |
| 771 | Renting and leasing of motor vehicles | 2.65 | 0.34% | 0.34% | 0.22% | 55.8% | 46.7% | Creative Industries; Environmental Industries | -- | -- |
| 791 | Travel agency and tour operator activities | 2.61 | 0.87% | 0.87% | 0.57% | 12.5% | 80.6% | Hospitality and Tourism; Experience Industries; Blue Growth Industries | -- | -- |
| 801 | Private security activities | 0.66 | 0.71% | 0.71% | 0.46% | 2210% | 46.0% | -- | -- | -- |
| 802 | Security systems service activities | 6.33 | 0.68% | 0.68% | 0.45% | -77.9% | 44.1% | -- | -- | -- |
| 851 | Pre-primary education | × | × | × | 0.79% | 41.4% | 80.0% | -- | -- | -- |
| 854 | Higher education | × | × | × | 0.77% | 29.3% | 128.2% | Education and knowledge creation | -- | -- |
| 861 | Hospital activities | × | × | × | 2.74% | 28.9% | 103.6% | -- | -- | Medicine and human health |
| 889 | Other social work activities without accommodation | × | × | × | 0.39% | 54.3% | 82.0% | -- | -- | -- |
| 900 | Performing arts | × | × | × | 0.38% | 38.4% | 78.1% | Experience Industries | -- | -- |
| 931 | Sports activities | × | × | × | 0.44% | 27.7% | 100.6% | Hospitality and Tourism; Experience Industries | -- | -- |
| 949 | Activities of other membership organisations | | × | × | 0.75% | 36.1% | 101.6% | -- | -- | -- |