SMART SPECIALISATION STRATEGY OF MONTENEGRO 2019 - 2024

Montenegro
Ministry of Science

S3.me

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July 2019

INTRODUCTORY WORDS OF THE PRIME MINISTER

Mr. Duško Marković, Prime Minister

Ever since the restoration of its statehood, Montenegro has continuously confirmed its capacity for rapid progress towards the democratic values of the developed world. NATO membership, frontrunner status in the process of EU accession, good neighbourly relations, above-average economy growth rates in the past three years and the implementation of impressive infrastructural projects are the best confirmation of the potentials at our disposal.

However, while taking note of the progress made and celebrating our success, it is important to strive for more and not to ignore the challenges ahead us on the way to the European quality of life for all our citizens. Montenegro needs stable long-term growth and development, as well as sustainable and competitive industrial production and employed young people who will drive our society forward with their creativity and hard work. The diversification of the economy, to at least several technologically intensive domains, is of particular importance in this effort.

Aware of the scope of our capacities, we do not have the illusion that we alone can make a capital contribution to global progress. Nevertheless, we have no right to ignore the need to make our own adequate contribution to this goal and to improve the quality of life in this region. The history of the brilliant minds of Montenegro and our present scientific research diaspora, which contributes to state-of-the-art science and technology worldwide, oblige us to support innovation in Montenegro with much more focus and energy. At all levels, but with special attention to young generations of professionals. Regardless of whether they are studying in the country, or temporarily looking for new knowledge at an address abroad, our task is to create, at least in the identified priority domains of action, a centre of gravity that will attract and retain those young professionals in Montenegro. Along with, as we hope, their colleagues from all over Europe.

Our response to the above challenges is Smart Specialisation Strategy, an instrument for linking sectoral policies and defining priority technological domains in which new added value can be created.

The document is based on thoroughly studied data, and its vision was established through a high-quality consultation process, which involved all parts of Montenegrin society. This process has confirmed that the vision of Montenegro as an ecological state is more than just a constitutional norm. It is one of the few national consensuses, upon which we need to build better future. This is why we are striving to identify and apply smarter and more competitive solutions in the domains of sustainable agriculture, green energy, sustainable health tourism and information technology.

We are the first in the region to apply this European tool for development based on technology, science and innovation. By doing so, we are facilitating cooperation with our European partners, creating new opportunities for placement of our products and services, as well as for increase of exports, technological improvement and attracting investments. Primarily, we are creating conditions for new, high-quality jobs for highly qualified personnel. That is why this strategy is another big step towards a better life for all our citizens.

INTRODUCTORY WORDS OF THE MINISTER OF SCIENCE

Dr Sanja Damjanović, Minister of Science

With the support of its science service – the Joint Research Centre, the European Union has established a precise and knowledge-supported methodology for EU regions to define their research and innovation priority areas and to establish regional cooperation platforms. This methodology is called regional smart specialisation (S3). S3 is a tool providing instructions on how to most effectively stimulate economic and social development, relying on research and innovation as the dominant development drivers in the global economy.

The EU has also instructed future EU Member States, including Montenegro, to start defining their smart specialisation strategies in order to be better prepared for cooperation at the moment of accession. One of the most important elements of smart specialisation is coordination in the programming and use of EU funds, which often lacked in the past periods, causing investment fragmentation. The same problem existed at the national level as well.

We accepted this task two years ago, when an intensive process of preparation of the strategy commenced, in accordance with the guidelines and with the support of the Joint Research Centre. For the first time in Montenegro, all the relevant society stakeholders were involved in a consultation process in such an engaged manner: enterprises, academic sector, state institutions, citizens. After extensive analyses, discussions, negotiations and harmonisations, the areas and technological domains were defined to which our country should direct its resources in order to create new value for our economy – new development projects, areas of application of scientific results, innovations and focused investments from the business sector.

Montenegro is the first non-EU country that has completed this complex process, standing ready to adopt its smart specialisation strategy. This will, I hope, soon result in stronger and more focused cooperation with EU regions that have similar priorities, as well as in new investments and greater breakthroughs in the development of technology, science and innovation in Montenegro, which would, at the same time, imply the development of our economy and society as a whole. We now have a clear pathway for our economy to utilise the new cooperation possibilities to become part of the broader, European value chains, offering more advanced products and services and finding new business growth opportunities.

At the beginning of the process of drafting the strategy, we said that the success of the process would be measured by the level of cooperation achieved between the various departments. We have achieved real progress in this regard and I am grateful to my colleagues from other ministries for their active participation. Now, the time has come for us to face the challenge of high-quality implementation, where there is a need for even better coordination of departments, policies and funding sources. I believe that, with the commitment of the Government to this policy, and with the support of our EU partners, we will succeed in this endeavour.

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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. The 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 economic 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 strategiy 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 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 business sector investment;
- They get stakeholders fully involved and encourage innovation and experimentation;
- They are evidence-based and include sound monitoring and evaluation systems.

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.

Through a partnership method and 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 itself enables the 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 particular regions, smart specialisation enables them to find their place in certain global markets and 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"[3] mechanism. The platform facilitates joint learning, data collection, analysis and networking opportunities for around 180 EU regions and 24 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[4] region, as it covers an area of 13,812 km^2 with a population of 620,029 inhabitants, residing in 21[5] municipalities with 1,307 settlements[6]. On this basis, when it comes to drafting 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.

In the section devoted to Negotiation Chapter 25: Science and Research, within the policy framework, the Programme of Accession of Montenegro to the EU (2019-2020) envisages that the Government of Montenegro should adopt the Smart Specialisation Strategy (2019-2024) by the end of second quarter of 2019. By adopting the Smart Specialisation Strategy, Montenegro is aligning its policy framework with the EU policy framework. Furthermore, by adopting the Smart Specialisation Strategy, Montenegro becomes the first non-EU28 country to adopt this policy document, which will have a positive impact on the reputation of Montenegro at the EU level.

In drafting the Smart Specialisation Strategy, the priorities and key directions of actions defined in the umbrella policy documents of Montenegro have been considered, and so have the priorities from the key sectoral documents, especially the ones to which the Strategy relates, as well as the international obligations of the country, with a particular focus on the accession to the EU[7].

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 and innovation capacities, gathering a critical mass of researchers and innovators that would work together on strategically important topics of research and innovation with a view to achieving research excellence and strengthening the potential of domestic innovative products for commercialisation. In addition, S3 may also encourage the development of new business sectors through investments in research and innovation in areas that contain strategic potential within the national framework.

3 http://s3platform.jrc.ec.europa.eu/
4 Nomenclature of Territorial Units for Statistics. Montenegro is defined as a single NUTS region on all three levels (NUTS 1 = NUTS 2 = NUTS 3).
5 24 municipalities in 2019.
6 According to information from 2011 census.
7 Links between the S3 and the umbrella policy documents of Montenegro are explained in the Qualitative Analysis.

II GOVERNANCE

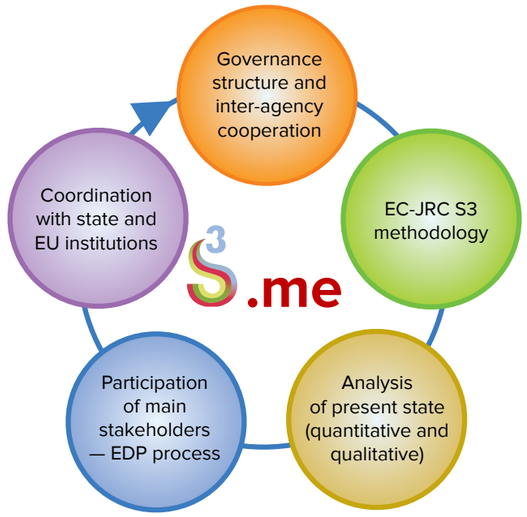
II 1. S3 DRAFTING PROCESS

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 S3 drafting process uses the methodology developed by Joint Research Centre of the European Commission (JRC)[8], which provided support in this process. 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. At the very beginning, it was necessary to create the governance structure for S3 development that would enable inter-agency cooperation. Having created the organisational infrastructure and adopted the JRC methodology, efforts were committed to prepare the quantitative and qualitative analysis needed in the selection of preliminary priority S3 domains. Up to this stage, the process has been implemented under a *top-down* principle. The next stage of S3 drafting was the Entrepreneurial Discovery Process (EDP), which utilised the *bottom-up* principle and the preliminary priority S3 domains from quantitative and qualitative analyses as the input parameters. The EDP process gave serious consideration to business sector opinions and interests, resulting eventually in the selection of priority S3 domains. Finally, at the end of the S3 drafting process, it was necessary to conduct state-level consultations and go through the public consultations process in accordance with the national legislation, as well as through the formal adoption by the Government of Montenegro. Following the adoption at the national level, S3.me is submitted to the European Commission for an opinion (Figure 1).

The Ministry of Science (MoS) has coordinated the process of developing the Smart Specialisation Strategy of 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 the experts of the European Commission. This model has enabled the Government to include all the relevant actors in preparation of the Strategy, while maintaining its role in organisation and management of the collaborative activities on the preparation of the document. Figure 2 below shows an organisational scheme representing the framework for dialogue between the main actors in the process of drafting the S3.

Figure 1 – S3 Development Process



8 One of Directorates General of the European Commission, https://ec.europa.eu/info/departments/joint-research-centre_en

The *S3 operational team* consisted of the representatives of the Ministry of Science and the Ministry of Economy, while the expanded operational team consisted of the representatives of all the universities in Montenegro. The main activities of the S3 operational team have been directed at 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, as well as with the external experts involved in the process of preparation of the Strategy.

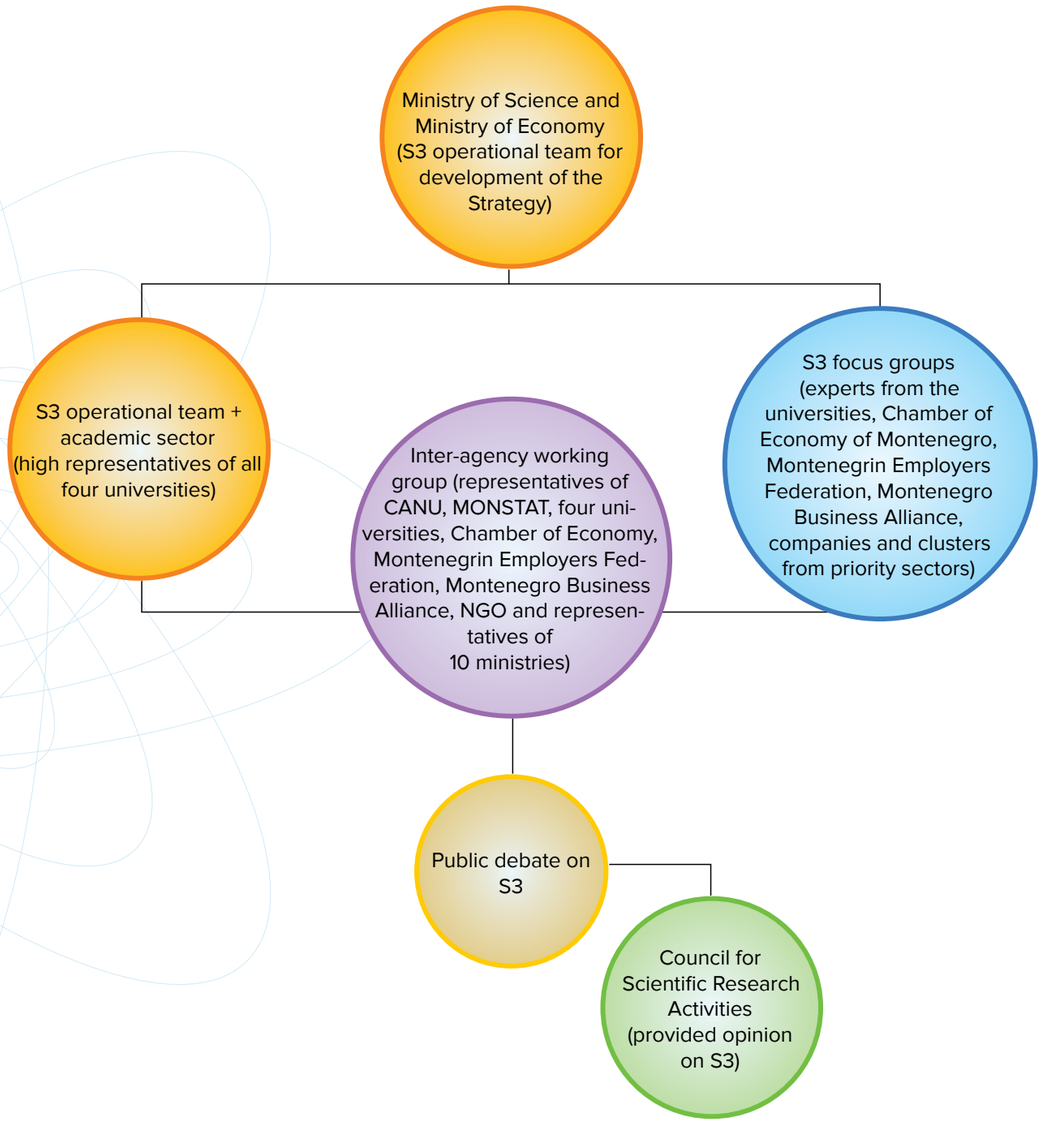
Through involvement of the academic sector at the operational level, provisions have been made for the Strategy to focus on research and innovation, which enables a more efficient and better-quality identification of key actors for implementation of the Entrepreneurial Discovery Process and preparation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

The S3 operational team has received expert assistance from *S3 focus groups*, which were specialised in thematic priorities identified through the process of quantitative and qualitative analysis for the S3. These groups have been composed of representatives of the business, public, academic and civil sector, acting as a pool for gathering information and ideas through the Entrepreneurial Discovery Process.

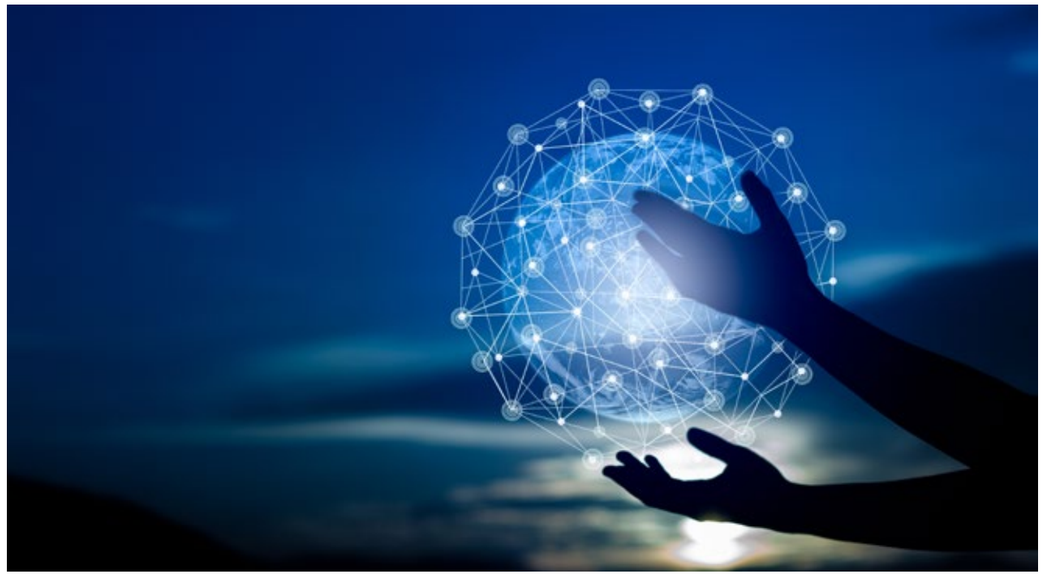
In addition, a separate *Inter-agency working group* has been formed from representatives of the business, public, academic and civil sector, with the role of managing the process of S3 preparation. This group has been involved in all the phases of Strategy preparation and has enabled transparency of that process, encouraging collaboration and participation of different segments of society. The inter-agency working group has also paid attention to compliance of S3 and general policy documents, with a special focus on alignment with the sectoral strategies governing the areas defined by the Strategy itself. Finally, the group has played a particularly important role in solving horizontal issues related to all thematic priorities and has supported the implementation and continuity of the Entrepreneurial Discovery Process.

One of the important steps in drafting the S3 was the process of mapping and analysing the economic, innovation and scientific potential in Montenegro. A quantitative analysis report titled “Mapping economic, innovation and scientific potential in Montenegro”, completed in March 2018, and a qualitative analysis report titled “Qualitative Analysis of Priority Areas for the Smart Specialisation Strategy of Montenegro”, completed in May 2018, served as the basis for identifying preliminary priority areas of smart specialisation, which was a precondition for the commencement of the Entrepreneurial Discovery Process.

Figure 2 – Structure of stakeholders involved in S3.me creation



II 2. GOVERNING STRUCTURE



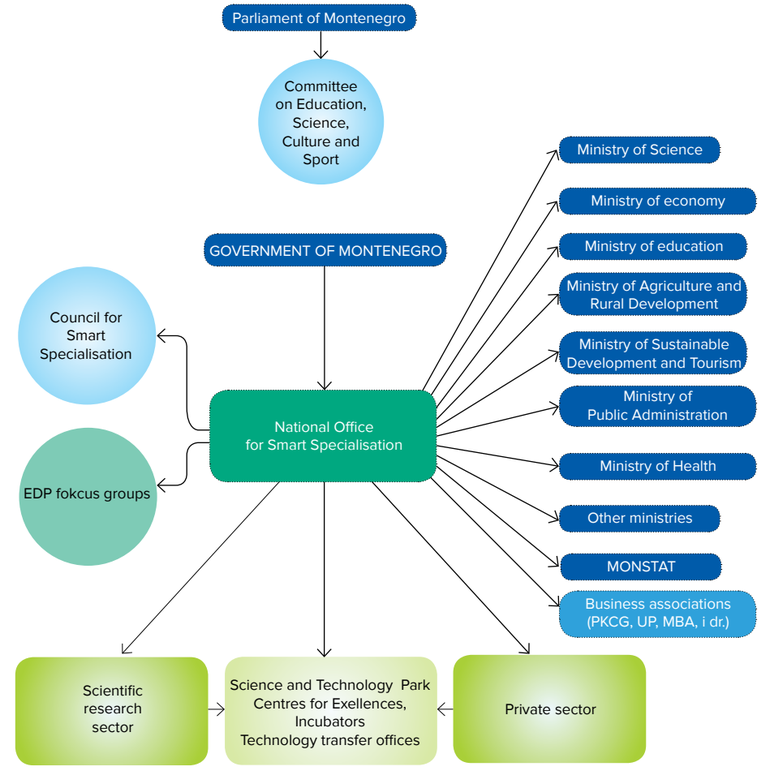
The basic organisational governance scheme for Montenegrin research and innovation system has not been significantly changed, but the activity of researchers and entrepreneurs has been strengthened in the past few years due to the more intense process of European integration and availability of the European funds for research and innovation, 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 innovation (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 business sector, monitors the implementation of strategies and laws in the area of research, development and innovation, providing expert suggestions in terms of improvement of the research and innovation policy. However, although the preparatory actions in relation to the S3 and other policy documents are undertaken 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, acting also as an important stakeholder in the implementation of the innovation policy through the realization of a series of programmes. Its organisational structure includes the Directorate for Internal Market and Competition with two divisions: Division for Intellectual Property and Division for Normative Affairs and International Cooperation in the Area of Intellectual Property. The Ministry of Education is responsible for higher education sector, within which scientific research activities are dominantly performed.

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



The *National Office for Smart Specialisation* works at the operational level. It operates under the Prime Minister's Cabinet 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 domains (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 Smart Specialisation. 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* as a new public body, based on quadruple helix model, is supervisory in nature. This body 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 priorities, as well as in ensuring the continuity of the Entrepreneurial Discovery Process (EDP).

The National Office for Smart Specialisation receives crucial inputs from *EDP focus groups* specialised in S3 priority domains. Through the activities of these groups, the continuity of the entrepreneurial discovery process in the implementation of the S3 is enabled. This is provided through periodical meetings of EDP focus groups, general public conferences 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 founded on knowledge and resources that should be utilised through related priorities of the Smart Specialisation Strategy. Furthermore, 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.

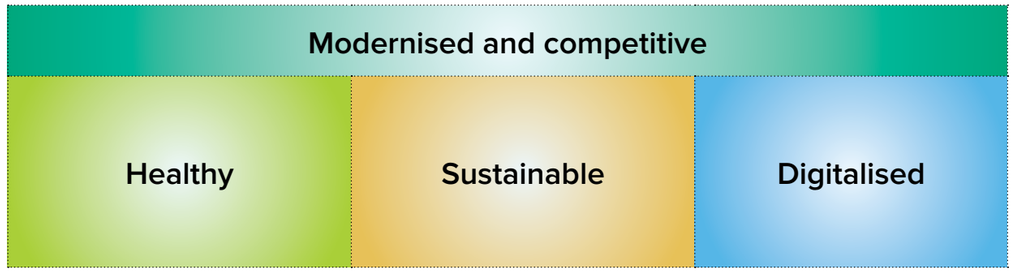
A modernised and competitive state is based on three key strategic directions, as follows:

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

These directions constitute a general vision of development of Montenegro and are in line with the spirit of the Smart Specialisation Strategy, representing a logical continuation of the efforts to meet the goals of the Europe 2020 Strategy. The strategic directions confirm the country's orientation to development based on knowledge, environmental protection, high employment level, productivity and social cohesion, with a focus on three interrelated development goals: smart growth, sustainable growth and inclusive growth.

Figure 4 below represents a long-term development vision for Montenegro, which should, through implementation of the Smart Specialisation Strategy, enable the overall prosperity of the country in general, improving 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



HEALTHY MONTENEGRO

With improved aspects of primary, secondary and tertiary protection and prevention and new products, strategic direction “Healthy Montenegro” will enable a higher level of life quality and therefore prosperity of the state. Healthy 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 (such as innovative and standard therapeutic and rehabilitation programmes) as a final product, with a view to attracting a special group of patients and researchers from the region and beyond. Healthy Montenegro is a society of technology for health, welfare, science, regional cooperation and peace.

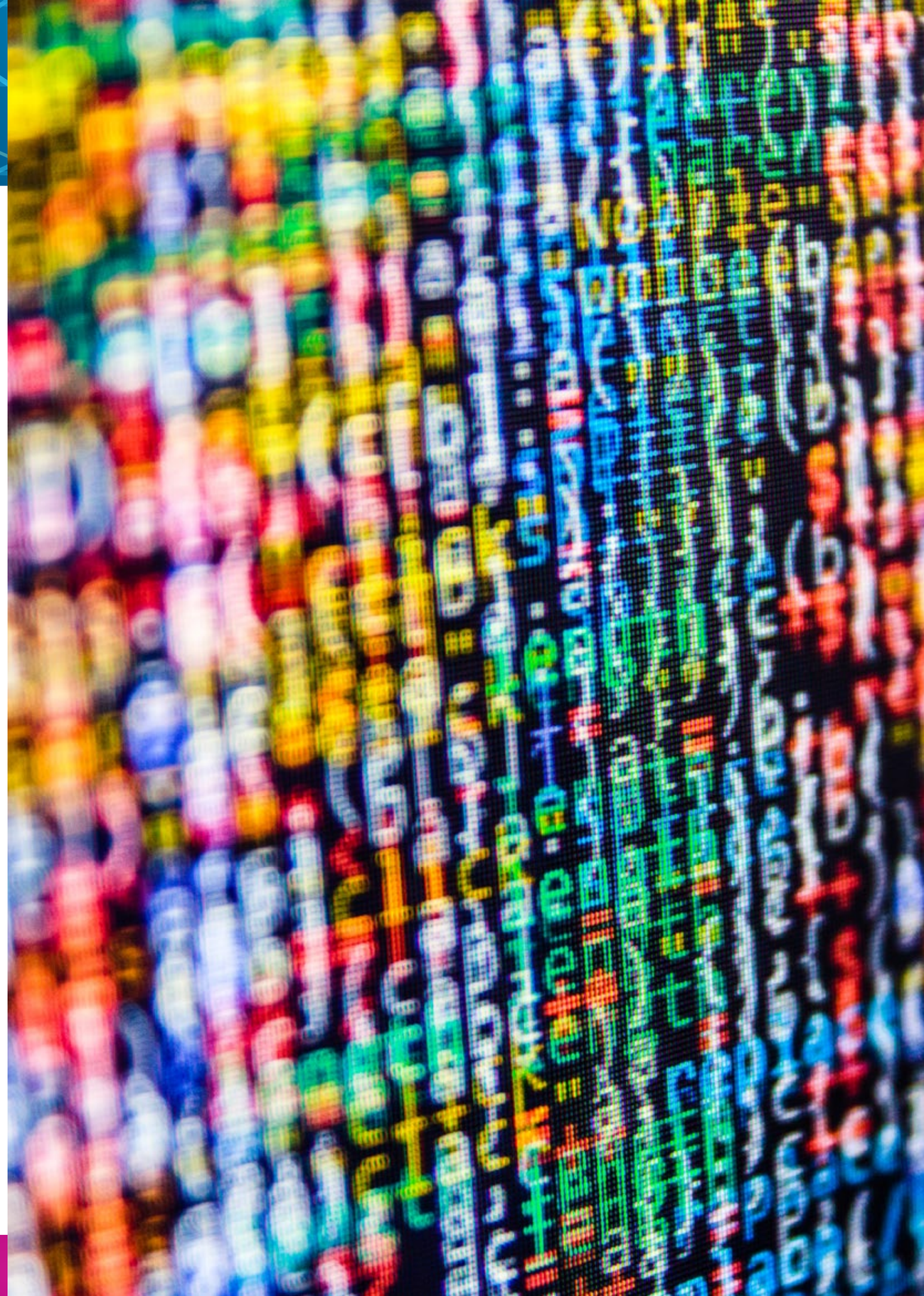
SUSTAINABLE MONTENEGRO

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 Sustainable 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 technogenic mineral raw materials and adequate reuse of waste under 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.

DIGITALISED MONTENEGRO

In accordance with the Industrial Policy of Montenegro by 2020, the national Strategy of Development of Information Society (2016-2020), and the national Strategy of Cyber Security of Montenegro (2018-2021), strategic direction “Digitalised 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. Meeting the ICT standards and goals will lead to development of trade, better use of capital and strengthened 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, digital economy and information security. The direction 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 other priority sectors.

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

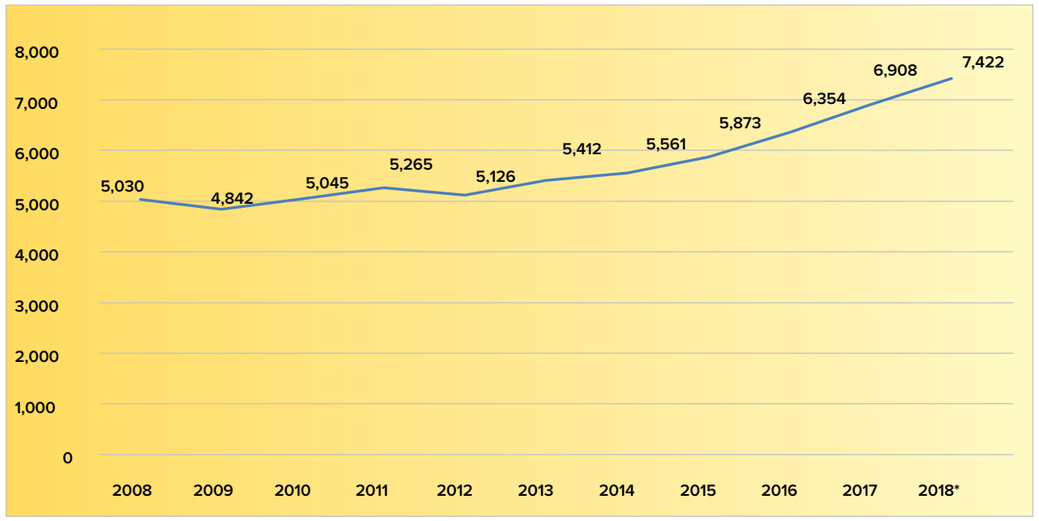


IV ANALYSIS OF POTENTIALS

IV 1. ANALYSIS OF ECONOMIC POTENTIAL

According to preliminary data by MONSTAT (Statistical Office of Montenegro), in 2018, Montenegro has achieved a positive economic growth rate of 4.9%. Based on the preliminary quarterly GDP data, in the same year, the gross domestic product (GDP) amounted to EUR 4.619 billion, while the gross domestic product per capita amounted to EUR 7,422[9] (Figure 5). The average annual inflation rate amounts to 2.6%.

Figure 5 – GDP per capita



Source: MONSTAT

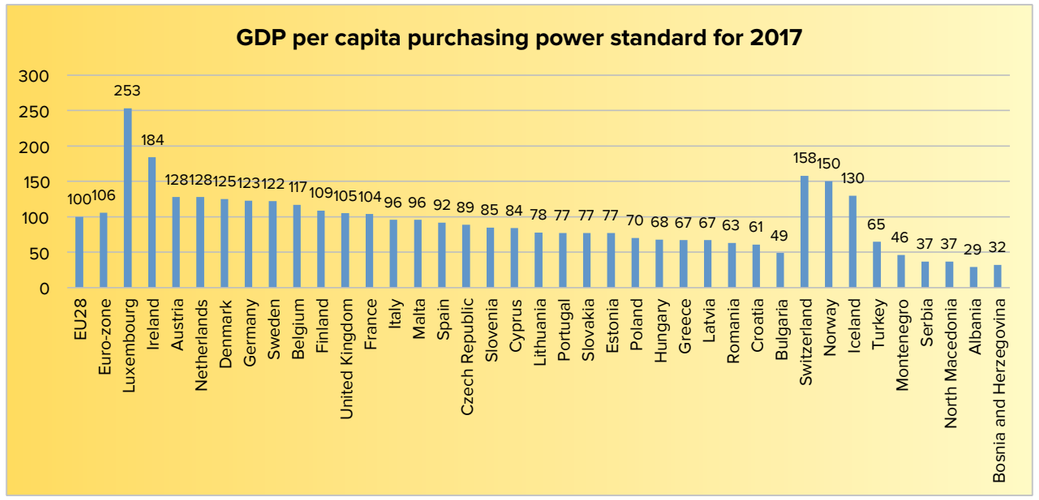
According to the preliminary model forecast of the Central Bank of Montenegro, the growth of national GDP in 2019 will amount to 2.7–3.2%, with a central tendency of around 3%. Therefore, the estimated growth of Montenegrin economy of 4.9% in 2018 is above the average growth of European economies amounting to 3.8% with an expected short-term decrease tendency, but not below the average growth in developed countries, and especially not below the Eurozone average.

Based on the first Eurostat estimates, gross domestic product per capita measured at purchasing power parity[10] in Montenegro amounted to 46% of the EU average in 2017. Compared to the EU Member States, Montenegro is ranked lower than Bulgaria as the lowest-ranked EU Member State sitting at 49% of the European average. Compared to the countries of the region, Croatia is the only country ranked better than Montenegro, with 61% of the EU average. Therefore, the country is ranked in the top part of the scale when compared to the region, and slightly below half of the European average (Figure 6).

9 Data on population is MONSTAT's estimate as of 1 January 2018.

10 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.

Figure 6 – GDP per capita, measured at purchasing power parity in EU and the region (EU=100)



Source: MONSTAT

Based on the IMF estimates[11], a growth rate of global economy in 2018 amounted to 3.7%. Developed countries grew by the average rate of 2.3% – US economy at a rate of 2.9%, Euro-zone countries at 1.8%, Japan at 0.9%. Based on the same predictions, a group of developing European economies, including Montenegro, achieved an average growth of 3.8% in 2018. For the period of 2019–2020, smaller growth rates have been predicted, amounting to 0.7%, and 2.4% respectively.

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[12]. In 2018, Montenegro improved its position by 2 places.

11 IMF: "World Economic Outlook Update" – January 2019.

12 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.

According to MONSTAT data, the average gross wage in Montenegro in 2018 amounted to EUR 766.00, which is an increase of 0.1% compared to the previous year. Average wage without taxes and contributions amounted to EUR 511.00 and was 0.2% higher compared to the previous year.

The number of employees in Montenegro in 2018 amounted to 190,132 on average and was 4.3% higher compared to the average number of employees in the previous year. Growth in the number of employees in 2018 was achieved in fifteen out of the total of nineteen sectors, with the highest growth rates in the sector of administrative and auxiliary services (13.5%) and construction sector (12.5%), and the lowest in the sector of water supply, waste water management and waste disposal process control (0.9%)[13]. Unemployment rate published by the Employment Agency of Montenegro amounted to 17.83% in December 2018, which is a decrease of 4.26% compared to the rate recorded in December 2017.

13 Annual macro-economic report of the Central Bank of Montenegro, 2018.

Budget deficit consequently increases the net public debt, which, at the end of 2018, amounted to EUR 2.99 billion, of which EUR 2.76 billion accounted for foreign debt.

Based on preliminary data, net inflow of foreign direct investments in 2018 amounted to EUR 327.6 million, which is a decrease of 32.4% compared to the previous year. Total inflow of foreign direct investments amounted to EUR 843.1 million, out of which ownership investments accounted for EUR 519.9 million, whereas the inflow in the form of inter-company debt amounted to EUR 300.1 million.

According to Monstat data, the industrial production grew by 22.4% in 2018 compared to 2017. The share of manufacturing industry in the GDP in 2017 amounted to 3.8%. In 2018, construction recorded a significant increase in the value of completed construction works (24.9%), as well as an increase in effective working hours (10.9%), compared to 2017. According to the *Statistical Yearbook of Montenegro* for 2018, in the forestry sector there was a production growth of 15.8% in 2017 compared to 2016. Based on the data of the Ministry of Sustainable Development and Tourism, in 2017, Montenegro was visited by 10.3% more tourists than in 2016, who accounted for 11.9 million overnight stays.

It is evident that tourism, construction, and transport can be identified among the key growth sectors, with the continuous growth of trade. The main driver of the economic growth in the coming period will be strong investment activity coming as a result of planned capital investments for construction of the Smokovac–Mateševo highway, as well as the investments in the area of tourism, energy (for example, construction of a solar power plant in Briska Gora), telecommunications, etc.

A statistical overview and analysis of national economy data has been summarised in Table 1[14]. 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 exceeds 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.

14 For the detailed explanation of the methodology, see Annex 1.

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[15]	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%	--	--	--
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

15 Blue Growth Industries include the following focal areas: ocean energy, aquaculture, maritime transport, coastal and cruise tourism, maritime mineral resources, blue biotechnology (COM2012/0494).

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
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[16]; 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
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

16 Experience Industries include: accommodation and travelling, food and drinks, museums and parks, sports and recreation, art (European Cluster Observatory)

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
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%	--	--	--

Source: Ministry of Science, 2018

Given that transport, construction and financial services do not have an export component, they are generally less qualified to be economic priorities. However, given that the construction sector accounts for the highest growth recorded (8.8%) when compared to all industrial sectors, it justifiably finds its place among the priority business sectors.

Results of the analysis show that specialised sectors with strong economic potential are: 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 Activity* (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 research 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 the S3 priorities.

Scientific research institutions carry out scientific research 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 possess significant resources (University of Donja Gorica, University of Mediteran and Adriatik University).

The analysis of international cooperation in scientific publications and cooperation in R&D projects financed by European programmes has confirmed that the University of Montenegro (UCG) is by far the largest actor in research and development. This is particularly the case in terms of ICT, agriculture, manufacturing industry and materials, as well as in electrical and electronic technologies. The second most productive institution in Montenegro is the Clinical Centre of Montenegro (KCCG), specialised in the health sector. The third major actor is the Public Health Institute of Montenegro (IJZCG), also very active in the health sector, environmental science and biochemistry (Figure 7).

Figure 7 – The main actors in research across domains by number of records (all sources) (colour intensity denotes the relative contribution, computed column-wise).

	ICT	Environmental sciences and industries	Health & wellbeing	Better societies - governance, culture, education and the economy	Food	Process industries and materials	Energy	Heavy machinery	Electric and electronic technologies	Transport
University of Montenegro	783	497	330	356	196	155	114	94	70	51
Clinical Center of Montenegro	4	2	201	2	2	0	0	0	0	0
Institute of Public Health of Montenegro	0	31	47	7	13	10	0	0	0	1
Mediterranean University	52	0	0	40	1	0	6	0	1	2
University of Donja Gorica	28	4	2	16	6	0	1	0	0	5
Institute of Marine Biology	0	46	3	0	2	1	0	0	0	0
Center for Ecotoxicological Research of Montenegro	1	18	17	0	6	0	0	0	0	0
Montenegrin Academy of Sciences and Arts	1	12	2	3	0	6	0	16	0	0
Natural History Museum of Montenegro	0	25	2	0	0	0	0	0	0	0

Source: Matusiak M. (ed.), Smart specialisation in the Western Balkans – potential for knowledge-based economic transformation, European Commission, Joint Research Centre (draft report to be published in 2019)

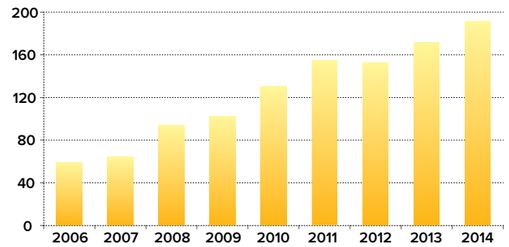
According to the *Global Competitiveness Report* for 2018, Montenegro is ranked 71st out of the total of 140 countries in terms of competitiveness of the national economy. Within pillar 12, the Innovation Capacity, Montenegro is ranked 74th. Within this pillar, in terms of their quality, the Montenegrin 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 8). Most publications are in the fields of biological sciences, engineering, geoscience, mathematics, medical science and physics.

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.

Figure 8 – Number of scientific publications



Source of data: Web of Science

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 2a).

Table 2a – Scientific specialisations

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

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

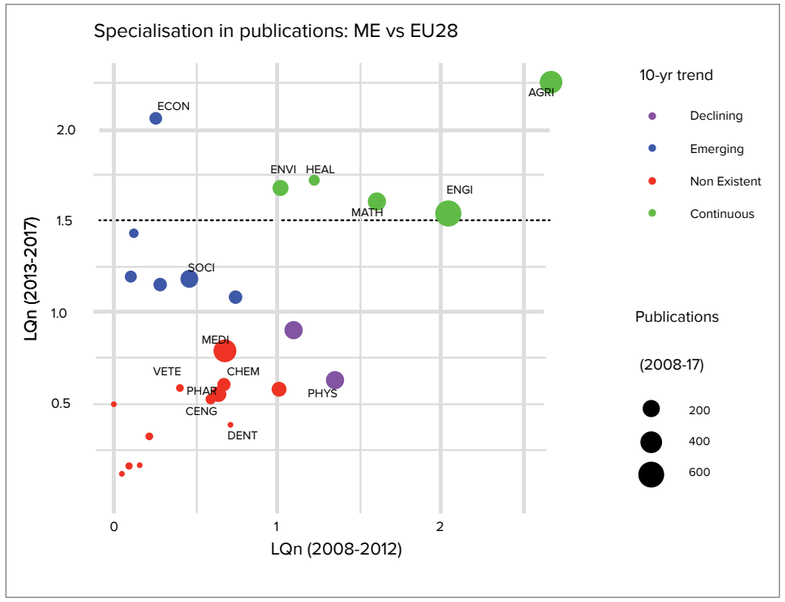
Furthermore, in addition to this analysis of scientific potential, analysis was also conducted at the level of the countries of the Western Balkans. Thus, the scientific results of Montenegro in terms of publications and the period in which they were published (2008-2017) mainly relate to engineering (611), medicine (458), agricultural and biological sciences (426). Mathematics (271), computer science (260), physics (237) and social sciences (213) account for the second level of subject areas with significant scientific results. Finally, the following areas can be regarded as new specialisations in the second five-year period: environmental protection (172), economics (80), health sciences (43) and decision sciences (29) (Table 2b, Figure 9).

Table 2b – Scientific Specialisations

LQn> 0.13	2008-2012	2013-2017
High Specialisation	• Engineering (611) • Medicine (458) • Agricultural and Biological Sciences (426)	
Strong specialisation	• Mathematics (271) • Computer Sciences (260) • Physics (237) • Social Sciences (213)	
New specialisations		• Environmental Protection (172) • Economics (80) • Health Sciences (43) • Decision-making (29)

Source: Scopus

Figure 9 – Specialisation trends for all subject areas calculated for two five-year periods



Source: Matusiak M. (ed.), Smart specialisation in the Western Balkans – potential for knowledge-based economic transformation, European Commission, Joint Research Centre (draft report to be published in 2019)

At the national level, 157 research projects were funded in the two-year period (2016-2018), with 100 projects that had an international component (Table 3).

Table 3 – Nationally funded research projects (2016-2018)

		Natural sciences	Engineering sciences	Medical sciences	Agricultural sciences	Social sciences	Humanities
National scientific research projects	Project value €	245390	4588000	1289000	528385	414376	201100
	Number of projects	13	13	8	7	10	6
Bilateral scientific research projects	Project value €	119600	102300	6700	67400	41000	55500
	Number of projects	29	27	4	15	16	9

Source: Ministry of Science

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 Horizon 2020. Since 2014, Montenegrin research teams have participated in 18 projects, eight of which have been completed. Based on the data available, there are also 8 projects financed under H2020 in which Montenegrin research teams participate as “third parties” (Table 4).

Table 4 – Distribution of projects in H2020 (2014-2019)

Domain	H2020	H2020 priority projects	Total
Research infrastructures including e-infrastructures	6	2	8
Health, Demographic Change and Wellbeing	2	1	3
Food Security, Sustainable Agriculture and Forestry, Marine, Maritime and Inland Water Research and the Bioeconomy	2		2
Safe, clean and efficient energy	1		1
Climate Action, Environment, Resource Efficiency and Raw Materials	1		1
Secure societies – Protecting freedom and security of Europe and its citizens	2		2
Leadership in Enabling and Industrial Technologies	1		1
Marie Skłodowska-Curie actions	1		1
Innovation in small and medium-sized enterprises	2		2
ICT		3	3
Access to risk finance		1	1
Science with and for society		1	1
Total	18	8	26

Source: Ministry of Science

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 Activity* (2016-2020) with the Action Plan. The strategic focus has been directed at three main strategic goals: Increasing the capacities for innovation and technological development of Montenegro; 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[17], in December 2018, the Government adopted the *Programme of Incentives for Innovative Start-ups in Montenegro*, with accompanying Action Plan.

Based on the established institutional framework, support programmes are implemented for the development of innovations in the economy with a view to commercialisation of research. Promotional and advisory support necessary for the transfer of technological solutions, knowledge and experience is actively realised through EEN network.

Based on the technological readiness factor within the *Global Competitiveness Index* for 2017-2018, Montenegro is ranked 48th out of the total of 137 countries. Pursuant to the *Global Innovation Index*[18] for 2018, Montenegro was ranked 52nd among 126 countries included in the survey. Based on the GII 2018, 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 innovation potential of a country.

The registration of patents in Montenegro in the reference period (2007-2016) was predominantly focused on six IPC codes: A01 (Agriculture and forestry; animal husbandry, hunting, trapping, fishing), A61 (Medical or veterinary science, hygiene), H02 (Generation, conversion, or distribution of electric power), E04 (Building), F01 (Machines or engines in general) and F04 (Positive-displacement machines, pumps) – Table 5.

Table 5 – Distribution of patents by IPC codes (2007-2016)

IPC Code	Description	Number of patents
A01	Agriculture and forestry; animal husbandry, hunting, trapping, fishing	10
A61	Medical or veterinary science, hygiene	8
H02	Generation, conversion, or distribution of electric power	6
E04	Building	6
F01	Machines or engines in general	4
F04	Positive-displacement machines; pumps	4

Source: Directorate for Internal Market and Competition (Ministry of Economy)

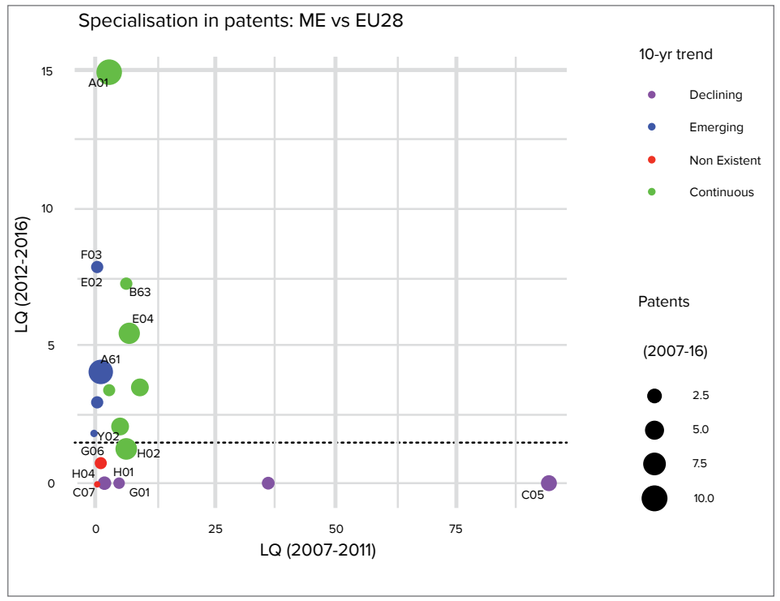
17 H2020 Policy Support Facility: Towards Entrepreneurial Innovation Ecosystems in Montenegro.

18 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.

Among the codes considered, A61 (Medical or veterinary science, hygiene) is strongly specialised, while the others are highly specialised (i.e. LQn>1.5), in both halves of the reference period (Figure 10).

There were 33 IPC codes in the European Patent Office's patent dataset for Montenegro. Of these, 17 were associated with more than one records. Seven IPC codes were recorded only in the first half of the reference period, while six codes were recorded only in the second half.

Figure 10 – Specialisation trends for all IPC codes calculated for two five-year periods for Montenegro



Source: Matusiak M. (ed.), Smart specialisation in the Western Balkans – potential for knowledge-based economic transformation, European Commission, Joint Research Centre (draft report to be published in 2019)

The Western Balkans inventive capacity is shown in Table 6. The table provides the volume of patent families in the selected economies, eliminating the repeated counting of the same patent registered across different patent offices.

Table 6 – Volume of inventive technological activities (patent families) and destination economies (applicant)

Inventor(s) of residence	INPADOC patent families, 2000-2017	Top 2 applicant locations
Albania	51.2	Albania - USA
Bosnia and Herzegovina	214.3	Bosnia and Herzegovina - USA
Montenegro	49.8	Montenegro - USA
North Macedonia	96.9	North Macedonia - USA
Serbia	2166.2	Serbia - USA

Source: Matusiak M., Kleibrink A. (ed.), Supporting an Innovation Agenda for the Western Balkans: Tools and Methodologies, Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-81870-7, doi:10.2760/48162, Joint Research Centre of the European Commission

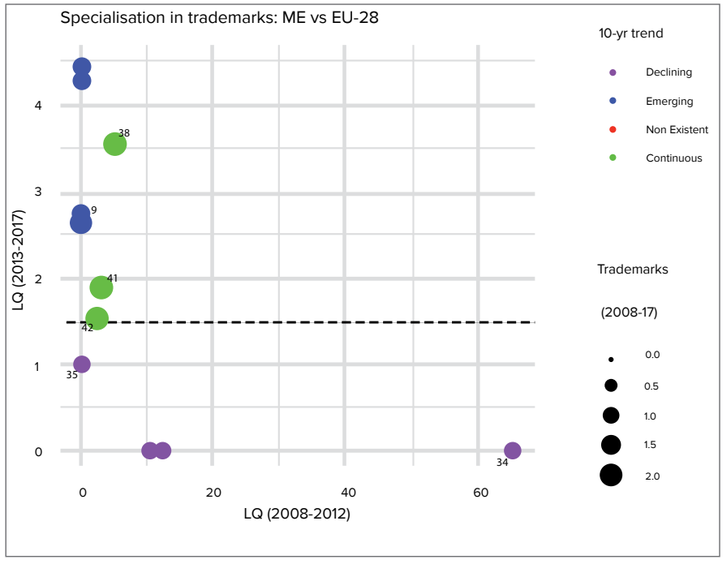
The number of registered EU trademarks in Montenegro in the reference period (2008-2017) is very low. In 45 Nice Classification Classes, Montenegro was active in 11, including 6 in the goods category and 5 in services category (Table 7, Figure 11).

Table 7 – Most common Nice codes

Nice goods classes	Nice services classes	Description	Registered trademarks
9		Apparatuses, instruments and computers	2
	41	Education Provision of training Entertainment Sporting and cultural activities	2
	42	Scientific and technological services and research and design relating thereto Industrial analysis and research services Design and development of computer hardware and software	2
	38	Telecommunications	2

Source: Directorate for Internal Market and Competition (Ministry of Economy)

Figure 11 – Specialisation trends for all Nice Classification Classes calculated for two five-year periods for Montenegro

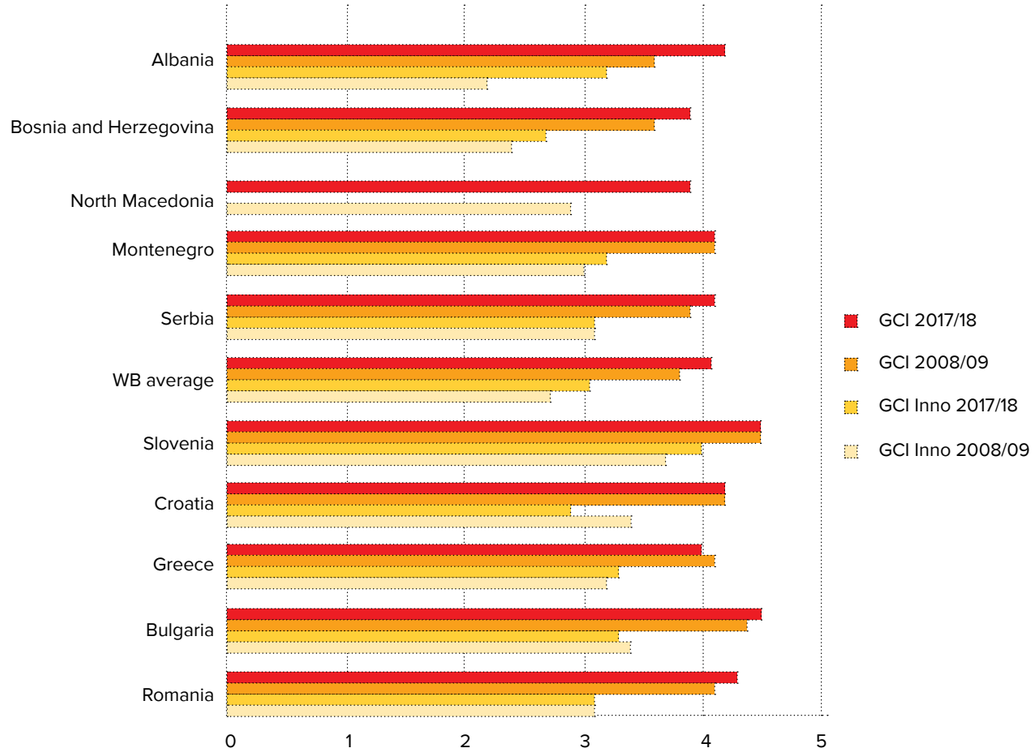


Source: Matusiak M. (ed.), Smart specialisation in the Western Balkans – potential for knowledge-based economic transformation, European Commission, Joint Research Centre (draft report to be published in 2019)

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 (Figure 12)[19]. 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).

19 World Economic Forum, https://weforum.org/

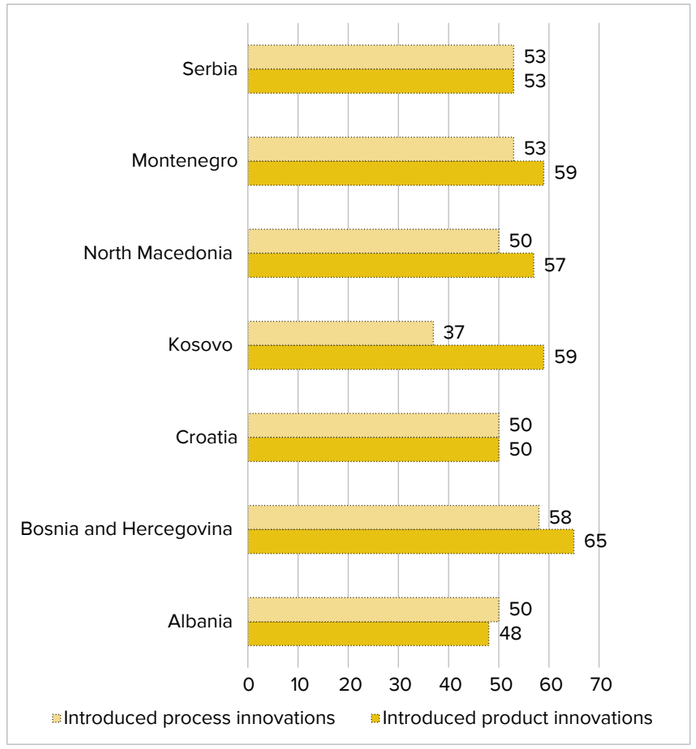
Figure 12 – Global Competitiveness Index, Innovation scores



Source: Matusiak M., Kleibrink A. (ed.), Supporting an Innovation Agenda for the Western Balkans: Tools and Methodologies, Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-81870-7, doi:10.2760/48162, Joint Research Centre of the European Commission 111430

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 the EU-28 average was 1.32% in the same year. The entrepreneurial-business sector employs about 7.75% of all persons engaged in research and development in Montenegro. 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 13).

Figure 13 – Share of enterprises (%) with innovation activities (2016)



Source: Balkan Barometer 2016

The available data indicate that the entrepreneurial sector does not invest in research and development as much as it should. This limits the capability of enterprises to develop new products, as well as the absorption of new technologies. National R&D activity is generally below the level present in other European countries. One of the restricting factors for a realistic assessment of the country's innovative capacity is the lack of detailed statistics.

IV 4. RESULTS OF POTENTIAL ANALYSES

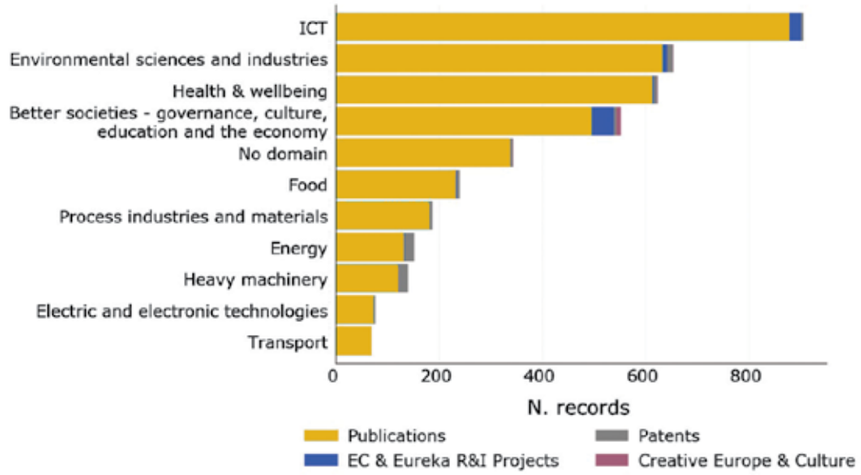
RESULTS OF THE QUANTITATIVE ANALYSIS[20]

At the end of the mapping process, the results of the economic, research and innovation potential need to be integrated with a view to initial identification of priority sectors to which smart specialisation ought to focus, directing the national policy instruments and measures. However, merging is not easy to implement, as the results of economic and innovation mapping are not present at the third level of the NACE classification, and when it comes to research mapping, the units of analysis are not sectors, but the fields of science instead.

In order to define the priority domains of *Quantitative analysis*, economic priorities are compared with the results of research and innovation analysis.

Results of the economic analysis presented in Table 1 show that sectors with strong economic potential are: agriculture and food, energy, ICT, manufacturing industry, medicine and quality of life, construction and tourism. These results are matched with results of research and innovation mapping by sectors shown in Figure 14, and Table 2a and 2b. Figure 14 indicates that ICT is the main sector in terms of outgoing I&R&D parameters for Montenegro, accounting for about 5% of total ICT production in the Western Balkans. ICT is followed by the environment, health and wellbeing, as well as better societies. Food, manufacturing industries and materials, energy and heavy machinery are much less prominent. Finally, electric and electronic technologies and transport are at the bottom of the list.

Figure 14 – Montenegro: Total results by sectors



Source: Matusiak M. (ed.), Smart specialisation in the Western Balkans – potential for knowledge-based economic transformation, European Commission, Joint Research Centre (draft report to be published in 2019)

20 Full text of the Quantitative Analysis is available at http://www.mna.gov.me/en/ministry/Smart_Specialisation/

When the semantic content of specialised sectors for Montenegro is compared with the WB countries, it may be noted that the records associated with Energy are focused on Power Systems; Environmental Sciences are focused on Marine Biology and Water Resources; ICT is focused on Signal Processing and Digital Communications; and Manufacturing Industries/ Materials are focused on Metals.

Sectoral analysis leads to conclusion that Montenegro is specialised for individual sub-sectors in most sectors. Furthermore, presence of a multidisciplinary approach is evident in most sectors.

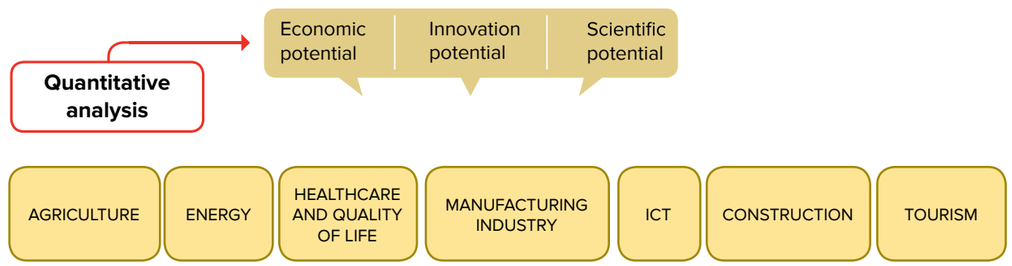
When the identified areas of economic, research and innovation specialisation are mapped together, we obtain the result of the Quantitative analysis, where specialised sectors to which the development priority should be given are the following: Agriculture and food; Energy; ICT; Manufacturing industry; Medicine and quality of life; Construction; and Tourism (Table 8 and Figure 15).

Table 8 - Results of Quantitative Analysis

ECONOMIC POTENTIAL									RESEARCH & INNOVATION POTENTIAL	
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%	Priority sector	Number of records (publication, patents, EC&Eureka R&I projects, Creative Europe and Culture)	H2020 Projects
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	FOOD 200	2
101	Processing and preserving of meat and meat products	0.41	0.32%	0.32%	0.21%	73.6%	58.3%	Agriculture and food; Manufacturing		
110	Manufacture of drinks	1.18	0.42%	0.42%	0.28%	1.1%	168.8%	Agriculture and food; Manufacturing		
161	Sawmilling and planing of wood	4.64	0.90%	0.90%	0.59%	1.7%	50.7%	Manufacturing	Process industries and materials 190	1
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%	Manufacturing		
241	Manufacture of basic iron and steel and ferro alloys	1.61	0.47%	0.47%	0.31%	-81.9%	91.0%	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%	Energy	ENERGY (including energy storage) 260	1
360	Water collection, treatment and supply	5.56	1.87%	1.87%	1.22%	7.6%	99.2%	Environment	Environmental science and industries 620	1
390	Remediation activities and other waste management services	78.46	1.96%	1.96%	1.28%	-35.1%	87.3%	Environment		
412	Construction of residential and non-residential buildings	1.64	3.55%	3.55%	2.32%	9.3%	78.3%	Construction industry	Heavy machinery 120	
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		

ECONOMIC POTENTIAL									RESEARCH & INNOVATION POTENTIAL	
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%	Priority sector	Number of records (publication, patents, EC&Eureka R&I projects, Creative Europe and Culture)	H2020 Projects
1	2	3	4	5	6	7	8	9	10	11
551	Hotels and similar accommodation	2.95	4.90%	4.90%	3.19%	-2.6%	85.9%	Tourism	Records within Biodiversity and natural capital; Environmental health determinants; Cultural heritage 50	
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%	Hospitality		
791	Travel agency and tour operator activities	2.61	0.87%	0.87%	0.57%	12.5%	80.6%	Tourism		
602	Television programming and broadcasting activities	5.87	0.93%	0.93%	0.61%	-1.1%	98.9%	ICT	ICT 900	3
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%	ICT		
861	Hospital activities	×	×	×	2.74%	28.9%	103.6%	Medicine and human health	Health and wellbeing 600	3
212	Manufacture of pharmaceutical preparations	0.51	0.22%	0.22%	0.14%	-23.6%	130.4%	Manufacturing; Medicine and human health		

Figure 15 – Results of the Quantitative analysis



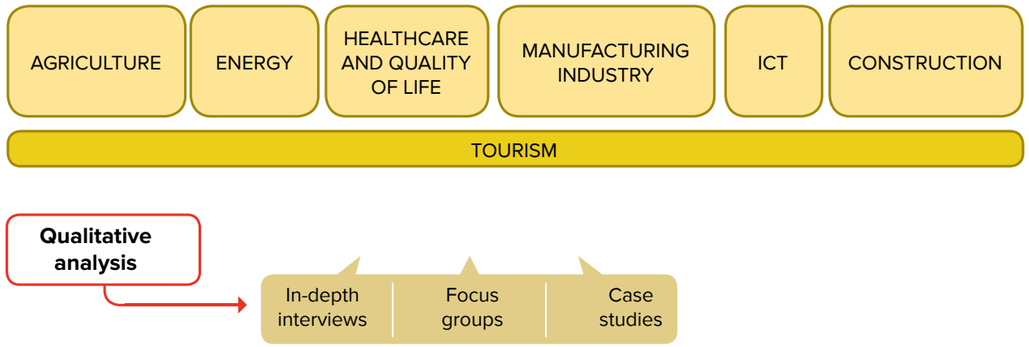
RESULTS OF THE QUALITATIVE ANALYSIS[21]

A *Qualitative analysis* of the economic, research and innovation potential of Montenegro commenced in the summer of 2017 and was completed in early May 2018[22]. This analysis reviewed the results of the Quantitative analysis and considered the development trends difficult to observe in quantitative terms.

The qualitative analysis assesses the potential for increasing productivity and export capacity of the sectors and sub-sectors, as well as the likelihood of utilising this potential. The starting premises for the qualitative analysis were the national strategic and programming documents that point to the development directions of the state. Along with the results of the quantitative analysis, these development directions were subjected to critical review and opinion of the surveyed representatives from the business, academic, civil and public sectors. Representatives of all sectors, and especially representatives of business associations and the most important business entities from the priority sectors determined by the quantitative analysis, provided answers to a set of questions. The semi-structured survey method was used to collect information, whereby the basic questions were always the same, while additional questions varied depending on the business sector.

Analysis of the gathered information led to qualitative analysis results that essentially match the findings of quantitative analysis. However, the qualitative analysis was aimed at new products, services and processes that can influence the creation of new value chains in the sectors. Furthermore, it addressed the issue of cross-sectoral relations, which are a significant dimension of S3 in existing and potential synergistic effects. At the same time, some ambiguities and doubts arose from quantitative analysis, because statistical indicators cannot give a complete overview of the situation in the real sector. Taking into account the aforementioned circumstances, the qualitative analysis has confirmed the preliminary priority sectors of the quantitative analysis. Also, their synergistic relationship has been more closely defined through diversification of vertical and the horizontal priority sectors. Tourism has been separated as a horizontal priority sector. The results of the qualitative analysis are provided in Figure 16.

Figure 16 – Results of the Qualitative analysis



21 Full text of the Qualitative Analysis is available at: http://www.mna.gov.me/en/ministry/Smart_Specialisation/
22 Annex 3.

RESULTS OF ENTREPRENEURIAL DISCOVERY PROCESS

After the quantitative and qualitative analyses that defined seven preliminary S3 priority areas (Agriculture and food, Energy, ICT, Manufacturing industry, Medicine and quality of life, Construction and Tourism), the Entrepreneurial Discovery Process (EDP) was initiated with a view to define the final priorities. The EDP has also identified final strengths, weaknesses, opportunities and threats (SWOT) for each priority sector, as well as the general SWOT analysis elements. The Entrepreneurial Discovery Process is *"an inclusive and interactive bottom-up process in which participants from different environments (policy, business, academia and civil society) are discovering and producing information about potential new activities, identifying potential opportunities that emerge through this interaction, while policymakers assess outcomes and ways to facilitate the realisation of this potential"*[23]. EDP primarily implies involvement of a broad pool of direct business representatives.

The preparation for the EDP was carried out through the training of the Montenegrin delegation organised by the RCC-JRC: How to start the S3 process and lead to an entrepreneurial discussion, which took place in early April 2018 in Ljubljana. The Entrepreneurial Discovery Process commenced with the organisation of the S3.me Conference "Smart Specialisation, Innovation, Entrepreneurship and Competitiveness", held on 11 May 2018, which brought together about 200 participants from the business, public, academic and civil sectors. After that, more than 60[24] workshops ensued in priority areas identified through quantitative and qualitative analysis. The work of focus groups by sectors was continuously monitored by experts from Slovenia recommended by Joint Research Centre of the European Commission (direct visits and online communication). The workshops resulted in more detailed definitions of the areas of development within the preliminary sectors and the potential for further development. Furthermore, a vision was determined that explicitly reflected each priority sector and goals were defined with concrete indicators and measures for the implementation of the Strategy. All the actors interested in the S3 development process had the opportunity to take part in the EDP by filling out a web questionnaire[25], which was available by the end of August 2018.

The final S3.me conference with about 150 representatives of all sectors of the society was held on 18 September 2018, providing the grounds for presentation of the EDP results. More than 300 different actors participated in this part of the Entrepreneurial Discovery Process, of which more than half were from the business sector.

Given that the Entrepreneurial Discovery Process is continuous, after the final S3.me conference, the Ministry of Science continued the activities supporting the Process. An analysis was conducted of data collected by processing applications to the call of the Ministry of Science for awarding grants for innovative projects, which was published in mid-year. The analysis confirmed the sectoral priorities of EDP, because the received applications thematically coincided with the defined priorities. In late September 2018, TAIEX expert mission was implemented with a view to build up the national capacities for smart specialisation. Finally, in early October 2018, the "Stock Exchange of Prosperous Ideas for Montenegro" was organised, where the presented development ideas matched the proposed priority sectors.

Based on the results of the previous EDP phases, four vertical priority sectors (Sustainable agriculture and food value chain, Renewable energy sources and energy efficiency, New materials and sustainable technologies, and Sustainable and health tourism) and one horizontal priority sector (Information and communication technologies – ICT) were defined. The priority nature of the subject sectors was additionally verified through the process of adopting the *Guidelines for the Smart Specialisation Strategy* (2018-2024), adopted by the Government of Montenegro in late 2018 as a document that attached institutional and formal significance to the S3 draft. Although this document has no binding character at the national level as the Strategy itself, the prescribed public debate procedure for its adoption was the same – including an interactive web platform for consultation, mandatory opinion of public institutions and an open hearing of the interested public – which can be considered

23 Smart Specialisation Platform - http://s3platform.jrc.ec.europa.eu/entrepreneurial-discovery-edp
24 Annex 2, Table A.
25 Annex 2, Table B.

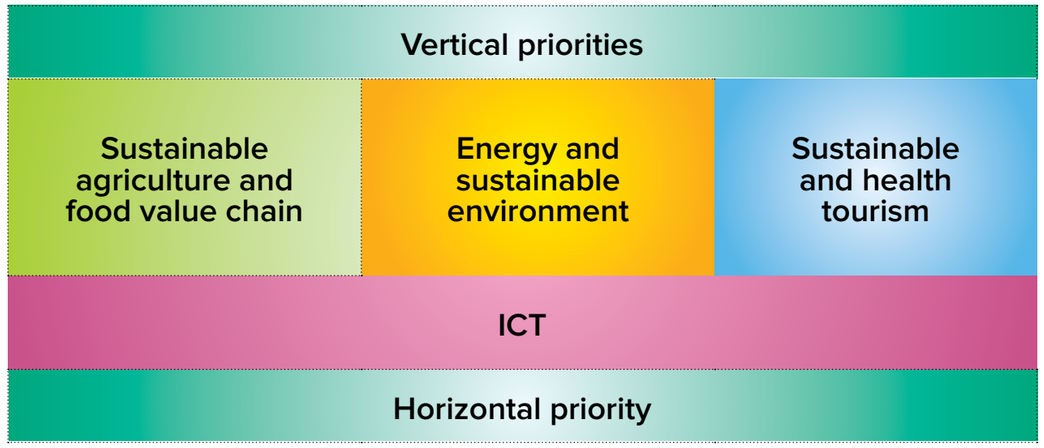
a separate phase of the EDP. At this stage of the EDP, a national independent consultative body was also included – the Council for Scientific Research Activities – which operates within the Ministry of Science and consists of distinguished representatives of scientific and business community.

Following the adoption of the *Guidelines for the Smart Specialisation Strategy*, the work on creating the final S3 document with the accompanying Action Plan has been continued. In early February 2019, a Joint Research Centre of the European Commission workshop for the Western Balkans entitled "Cooperation for Smart Specialisation" was organised in Podgorica, addressing, as one of the central topics, the analysis and suggestions for improving the draft of the Montenegrin S3. By the end of March 2019, a series of meetings by priority sectors took place with focus groups and institutional actors relevant for S3 implementation. Efforts were made to further focus the existing priority areas on the basis of additionally collected facts. At this stage of EDP, *Flagship initiatives*[26] were also identified for each of the priority domains. *Flagship initiatives* are programmes that contain a number of projects related to specific priority domain in which the country has a significant innovation potential. Projects within every Flagship initiative are connected by a common subject matter in relation to which there is both research and innovation capacity and commercialisation potential. These initiatives should mobilise a wide range of economic, research and institutional actors and available material and financial resources to engage in smart specialisation. Through open dialogue, using the referential Joint Research Centre of the European Commission methodology for S3 development, the S3 priority domains have been identified, as well as their synergy based on the strengths and potentials for research, development and innovation, with an emphasis on practical application and market orientation.

Identified priority domains are: Sustainable agriculture and food value chain, Energy and sustainable environment, and Sustainable and health tourism – as vertical priorities; and Information and Communication Technologies (ICT) – as a horizontal priority (Figure 17).

26 Annex 3.

Figure 17 - S3.me priority domains



The final EDP phase ahead of the adoption of the Strategy commenced in April 2019, when S3 draft was sent to the Joint Research Centre of the European Commission for final consultations. After that, the document prepared in accordance with the national legal framework for strategic policy planning[27], was adopted in the second quarter of 2019, following a mandatory public debate. Finally, the Smart Specialisation Strategy adopted at the national level will be submitted to the European Commission for a formal opinion.

27 Decree on the manner and procedure of drafting, harmonising and monitoring the implementation of strategic documents ("Official Gazette of Montenegro", no. 54/2018 of 31 July 2018) and Methodology for developing policies, drafting and monitoring the implementation of strategic documents.

V SWOT

STRENGTHS

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

WEAKNESSES

- Lack of “critical mass” within the scientific and research community due to fragmentation and isolation;
- Generally insufficient transfer of knowledge and technology from European knowledge centres;
- Insufficient investment and participation of the public and private sector in research and innovation activities;
- 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.

OPPORTUNITIES

- Enabled access to the leading international R&I funds;
- Enabled further access to large international research infrastructures (CERN, EMBL, etc.);
- Availability of natural resources and technogenic mineral raw materials for new industrial applications;
- Implementation of a “large research infrastructure for sustainable technologies” in South East Europe – SEEIIST;
- Establishment of Science and Technology Park and development of centres of excellence;
- Use of human R&I potential in diaspora;
- Clusters playing a more active role in the innovation ecosystem.

THREATS

- Outflow of highly qualified research and innovative human resources;
- Competition at the regional and global level;
- Insufficiently developed traffic infrastructure;
- Administrative barriers for investment and business development.

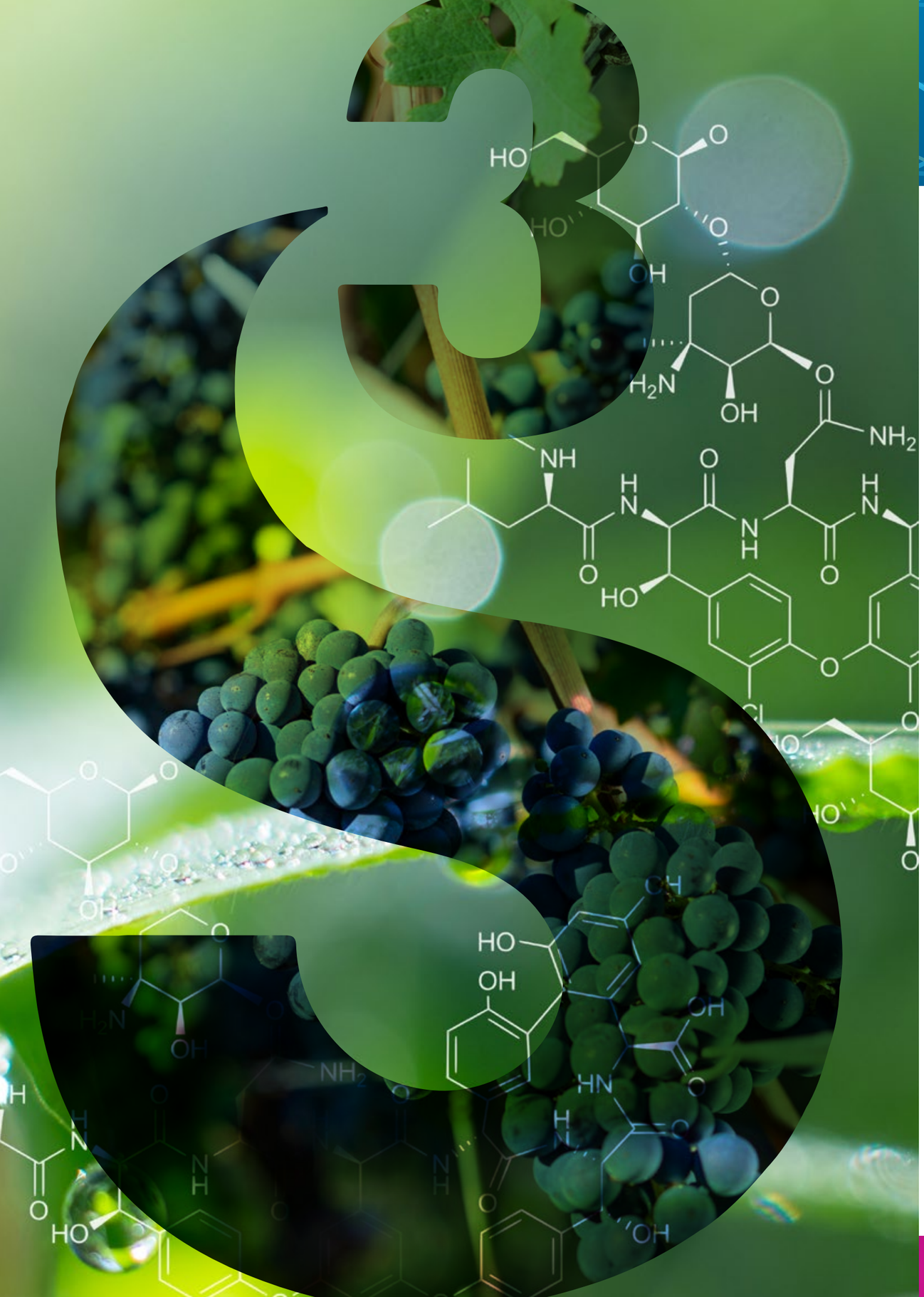
VI STRATEGIC S3 PRIORITIES

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

The selected priorities are the following: Energy and sustainable environment, Sustainable agriculture and food value chain, Sustainable and health tourism; and ICT, where ICT is a horizontal sector as it provides business and technological support to other priority sectors (Table 9).

Table 9 – Priorities and connection with development vision

PRIORITIES	DEVELOPMENT VISION OF MONTENEGRO			
	Healthy	Sustainable	Digitalised	Modernised and competitive
Sustainable agriculture and food value chain	x	x	x	x
Energy and sustainable environment		x	x	x
Sustainable and health tourism	x	x	x	x
ICT			x	x



VI 1. 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 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 food value chain (food industry and related sectors); it contributes to the development of tourism; it encourages the development of many other sectors (production of equipment, machinery and packaging material, transport and numerous services); it is crucial in the sustainable development and mitigation of the depopulation of rural areas; it contributes to the fight against poverty in rural areas and it is an important factor in preserving tradition and the overall cultural heritage of the Montenegrin villages.

There are numerous 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) ensured potential for growth and generating of new value through sustainable use of local raw materials; 4) a wide

FLAGSHIP INITITIVE

Priority domain:	SUSTAINABLE AGRICULTURE AND FOOD VALUE CHAIN
Programme:	Bio mapping and Engineering (BME)

The Programme aims to ensure the preservation of biodiversity and economic valorisation of the biological potential of autochthonous flora and fauna in Montenegro for the purpose of creation of innovative agricultural products. Their specificity and adaptability to local geographical and climate conditions can provide recognition and competitiveness in the international market, while meeting the latest professional standards. The Programme shall focus on:

RESEARCH COMPONENTS

- Identification and mapping of the genetic potential of autochthonous plant, animal and microbial species, breeds, varieties and strains;
- Conservation of identified biopotential for the purpose of future commercialisation and protection of endangered and endemic species.

INNOVATION COMPONENTS

- Creation and commercialisation of innovative and authentic agricultural products from selected autochthonous material.

range of local products for improving the overall tourism offer; 5) favourable conditions for organic production justifying the orientation of Montenegro as an ecological state; 6) a combination of traditional and innovative technologies in the production of numerous products; 7) producing by-products used as raw materials in energy production; 8) the preservation of the environment, biodiversity and landscapes.

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 basis for the food value chain that offers a wide range of authentic products to the consumers.

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 value chain;
- Innovation, creation of new products and application of new technologies for food production, including production of environmentally friendly and smart packaging;
- Sustainable use of marine resources for innovative products in biomedicine and pharmacology;
- Creation of new fruit and vegetable products;
- Innovative products from medicinal and aromatic herbs (production of oil, cosmetic products, pharmaceuticals, spa products, spices, beverages, etc.);
- Olive oil and other olive products.

RESEARCH AND INNOVATION ENVIRONMENT

SCIENTIFIC AND EDUCATIONAL INSTITUTIONS

- University of Montenegro, University of Donja Gorica, Public Health Institute, Montenegrin Academy of Sciences and Arts, Specialist Veterinary Laboratory.

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 aquaculture. As for the wine and beer production, there are internationally recognised brands, as well as 70 small vineries and 10 small breweries.

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, Montenegrin Accreditation Body, Institute of Hydrometeorology and Seismology, Centre for Ecotoxicological Research.

CIVIL SECTOR

- Centre for Consumer Protection.

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
Energy and sustainable environment	• Energy efficient and smart management of agricultural production • Use of waste as a resource
ICT	• Smart and efficient management of agriculture • Application of sensors for monitoring healthy food and environment

KEY PERFORMANCE INDICATORS

Indicator	**2019**	**Target value 2024**
Number of entrepreneurs and companies in organic production	360	600
Number of innovative and autochthonous products in the food industry	7	15

SWOT analysis

STRENGTHS	WEAKNESSES
• Preserved land • Richness in water resources for drinking and irrigation • Diversity of agroecological conditions across regions is suitable for the production of a wide range of products • Richness of biodiversity (numerous autochthonous plant and animal species suitable for agricultural cultivation) • Preservation of traditional production (knowledge, consumer culture, etc.) • The existence of the market (locally and tourist oriented) • Short food delivery channels to the consumers (local consumption) • Well-developed legal and institutional framework for the agricultural production	• Structural constraints (the quality of the land, the fragmentation of the estate, the land on the slopes unsuitable for mechanised processing) • Aging of active labour force and depopulation of rural areas • Poor rural and insufficiently developed market infrastructure • Inadequately affirmed farm-to-table approach • Insufficient competitiveness of domestic production • High production costs due to the high share of imported raw materials • Insufficiently developed control system in the production chain • Poor organisation of the producers (underdeveloped clusters) • Short-term vision of development (particularly in small and micro enterprises)
OPPORTUNITIES	**THREATS**
• Optimising the utilisation of agricultural land • Favourable conditions for organic production (low level of usage of mineral fertilisers – up to 10 x less than the EU average) • Substitution of imports with domestic products • Growing tourism offers the opportunity for absorption of seasonal surpluses and the placement of exclusive domestic products • Regional market offers the possibility of placement of the recognisable Montenegrin products (wine, prosciutto, honey, etc.) • Growing young manufacturing industry • Opportunities for merging traditional and new technologies • Intensifying the production using modern and innovative technologies	• Insufficient support from the financial sector to the family farms • Strengthening and monopolising of the large retail chains • Increase in energy products price • Climate change

VI 2. ENERGY AND SUSTAINABLE ENVIRONMENT

In the growth and development of energy and industrial capacities, Montenegro has decided to provide for compliance of its development needs with the standards of environmental and spatial protection. The centralised energy system has been replaced by the electricity market. Montenegro's approach in terms of the energy sector is to increase the share of energy use from renewable sources, with a special focus on the sustainable development of the sector. Many projects have been implemented or are being implemented – construction of mini hydro power plants, two large wind farms and a large solar power plant. In addition, the installation of a submarine electric cable, which will enable the connection of the electric power system of Montenegro and Italy is in the final phase. Economical, environmentally friendly and reliable production, transmission and use of electricity, as well as the identification of the manner of optimal management, become the main challenges of the modern electricity sector in the country.

Montenegro has great potential for renewable energy sources (RES). Hydroenergy provides two-thirds of the total energy production in the country, but only 17% of the theoretical hydroelectric potential has been utilised so far. The theoretical potential for hydropower in Montenegro is around 11 TWh/year, of which 5.7 TWh/year is economically usable. Out of this potential, the main rivers account for about 3.7-4.6 TWh/year, while the potential of small hydro power is estimated at 400 GWh/year. Twenty small hydro power plant projects have been realised so far, with a total installed power of about 33 MW. Wind energy has a significant potential for high-speed zones, i.e. areas with wind speeds above 7 m/s. Energy produced from wind can reach up to 25% (925 GWh) of annual energy consumption in the country. Krnovo (72 MW) and Možura (46 MW) wind farms point to the direction of 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. Solar energy is also a very promising resource as the average annual number of sunny hours in Montenegro is more than 2000, while the coastal areas have more than 2500 hours per year. The solar energy has so far mainly been

used for solar thermal heating and cooling of individual buildings. The construction of the first large solar power plant is planned at Briska gora, with capacity of about 250 MW. Montenegro has great opportunities to use the wood waste energy potential as well.

Increasing energy efficiency in general can be the cheapest and the most productive energy alternative. Significant energy and financial cost savings can be achieved through relatively small investments, better selection of energy efficient technologies, better organisation and improving the quality of electric power supply.

By applying adequate technologies, waste from Thermal Power Plant Pljevlja, which produces about 40% of the country's electricity, could be processed so that the end product is environmentally friendly. Generally, the manufacturing sector generates or has generated large quantities of industrial waste with significant potential for use, which needs to be identified first. The largest utilisation potential in the industrial waste structure lies with fly ash, red sludge, slag, metal dust and wood waste. With a view to waste characterisation, its physical, geochemical, chemical, mineralogical, biological, ecotoxicological and thermal characteristics need to be identified. The logical continuation of the characterisation process is then to select a procedure for further waste management in line with the circular economy principles.

FLAGSHIP INITITIVE

Priority domain:	ENERGY AND SUSTAINABLE ENVIRONMENT
Programme:	Renewable energy sources and energy efficiency

The Programme aims to ensure the increase in the usage of renewable sources of electricity and energy efficiency in consumption, while focusing on the innovative technical solutions for production, distribution, optimisation and electricity consumption. The Programme shall cover:

RESEARCH COMPONENTS:

- Integration of prosumers (users as producers of the energy) is requiring continuous power system optimisation that heavily relies on mathematical models and application of artificial intelligence algorithms.

INNOVATION COMPONENTS:

- Improvement of energy efficiency and reduction of CO2 emissions through smart concepts of smart buildings and cities;
- Development and technology transfer of innovative technological solutions for renewable energy sources (replacing fossil fuel heating systems with innovative renewable energy solutions, using wind power plants that are positioned at the highest altitude in Europe as a testing platform, etc.).

VISION 2024

Montenegro is recognised as regional energy hub with high-level use of renewable energy sources and mineral raw materials on the principles of circular economy and sustainable environment.

SECTORAL GOALS

Increasing innovative use of renewable energy sources
Increasing innovative activities in waste recycling and utilisation

FOCAL AREAS AND TECHNOLOGIES

EXISTING

- Hydro energy;
- Wind energy;
- Regional centre for recycling scrap metal;
- Producing energy products from wood waste;
- Energy efficiency and improvement of energy balance;
- Eco materials (wood, stone, aluminium, etc.) processing and use.

WITH POTENTIAL

- Solar energy;
- Smart networks and cities;
- Development of energy storage systems;
- Development of the concept of energy consumers/producers ("prosumers");
- Transport electrification;
- Technologies for utilisation of technogenic mineral raw materials;
- Reduction of consumption and CO2 emissions (eco active/passive facilities).

FLAGSHIP INITITIVE

Priority domain:	ENERGY AND SUSTAINABLE ENVIRONMENT
Programme:	Circular Economy (CE)

The Programme aims at strengthening the industrial competitiveness of Montenegro by recycling the industrial waste, i.e. the technogenic mineral raw material (red sludge, fly ash, foundry slag and ash, etc.) by extracting residual raw materials of high economic value and / or transforming them into new materials suitable for industrial use. Starting from the successful examples of such production in the world that generate competitive products and solve the issue of industrial waste, the Programme shall focus on:

RESEARCH COMPONENTS

- Enabling extraction of high-value components from the existing waste in an efficient and economical way, thus providing raw materials suitable for the industrial use;
- Addressing environmental issues related to permanent storage of the remaining industrial waste with no harmful consequences for the environment.

INNOVATION COMPONENTS

- Transforming waste material of good technogenic characteristics into innovative products that can be used in construction and other industrial branches (refractory bricks, tiles, fillers, foam aggregates, cement, ceramics, materials for mortar, concrete and asphalt, colour pigments, materials for floor coatings, absorbents, etc.).

RESEARCH AND INNOVATION ENVIRONMENT

SCIENTIFIC AND EDUCATIONAL INSTITUTIONS

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

COMPANIES

- Several large energy companies have been identified, as well as a significant number of small and medium-sized enterprises in the area of renewable energy (hydro and wind energy); there are several engineering enterprises that provide support to large energy systems.
- About 30 large, medium and small enterprises have been identified in the industrial and waste recycling sector.

BUSINESS ASSOCIATIONS

- Chamber of Economy of Montenegro, Montenegrin Employers Federation, Montenegro Business Alliance, Association of Oil Companies of Montenegro, Association of Concessionaires of Small Hydro Power Plants.

PUBLIC INSTITUTIONS

- Ministry of Economy, Ministry of Sustainable Development and Tourism, Environmental Protection Agency, Ministry of Science, Ministry of Public Administration, Ministry of Education, Ministry of Agriculture and Rural Development, local self-government bodies, Energy Regulatory Agency, Montenegrin Electrical Energy Market Operator (COTEE), Investment and Development Fund, Office for Geological Surveys.

CIVIL SECTOR

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

SYNERGISTIC EFFECT IN RELATION TO OTHER PRIORITY SECTORS

	Energy and sustainable environment
Sustainable agriculture and food value chain	• Energy efficient and smart management of agricultural production • Use of waste as a resource
Sustainable and health tourism	• Energy efficiency of tourist and healthcare facilities
ICT	• Optimum management of the electrical energy systems and networks • Managing data on the state of play and potentials in energy • Cyber security • Smart energy systems – smart energy and information transportation • Smart trade and electrical energy management – energy market • Smart waste management

KEY PERFORMANCE INDICATORS

Indicator	2019	2024.
Number of enterprises in the field of renewable energy sources	50	80
Percentage of processed industrial waste	3.4%[28]	5%

SWOT analysis

STRENGTHS	WEAKNESSES
• Geographical position and completed capital energy projects make Montenegro an energy hub of the Balkans • There are various production capacities in the country (hydro, wind and thermal) • National energy system is small and flexible • Decentralisation of the EES has been carried out by establishing separate entities (production, transmission, distribution, stock exchange, market operator and regulatory agency) • Large reserves of technogenic mineral raw materials • Regulations have been harmonised with European regulations and standards	• Bureaucratic problems related to business operations of energy companies • Lack of local energy plans • Low level of waste processing
OPPORTUNITIES	**THREATS**
• Potential in renewable energy sources • Development of the smart energy and information transport • Development of energy market analytics • Construction of charging stations for electric cars for better tourist offer • Investment/research in smart energy networks and smart infrastructure (houses, buildings, hotels, roads, crossroads, etc.) • Transmission and transit of energy (cable to Italy and planned gas pipeline) • Development of hybrid energy systems (diesel-solar, wind-solar, etc.) • The country can be used as a test energy environment (wind farms at Krnovo-Gvozd, etc.) • Possibility of using industrial waste for extraction of high-value mineral elements through innovative technology • Possibility of using waste for production of new materials (for construction and other business sectors) • Creating new industrial activities on the basis of raw materials which use is enabled thanks to innovative technologies (extraction or industrial waste processing)	• Cyber security in business and management of energy systems (production capacities, energy trading, etc.) • High-value export of raw materials contained in waste

28 Monstat (2017)

VI 3. SUSTAINABLE AND HEALTH TOURISM

From year to year, tourism increasingly justifies the role of a strategic business sector, especially given the fact that its total share in GDP is continuously growing (amounting to 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 business sectors as well – 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 particular 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 accommo-

dates 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 with 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.

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

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

FLAGSHIP INITITIVE

Priority domain:	SUSTAINABLE AND HEALTH TOURISM
Programme:	Adriatic Centre for bone and muscular system diseases

This Programme aims at modernising and improving Montenegrin existing facilities for medical treatment and rehabilitation in the cases of bone and muscular system diseases, as well as at transformation into recognised centre for such treatments in the region and South Europe. This would provide an export-oriented year-round health tourism services towards high-paying markets. Following the latest standards of medical and tourist services, the programme shall integrate:

RESEARCH COMPONENTS

- Carry out research and improvement of medical and rehabilitation treatments for bone and muscular diseases, including the development of biomechanics (prosthetics, bio-robotics and exoskeletons) and the application of nanotechnology.

INNOVATION COMPONENTS

- Provide innovative and highly specialised medical treatments for bone and muscular system diseases (orthopaedics, rheumatology, neurosurgery, sports medicine, etc.);
- Provide prevention and rehabilitation for patients with bone-muscular diseases, by applying advanced standards and innovative methods (physiotherapy, kinesiotherapy, balneology, acupuncture, chiropractic, etc.).

advanced for 9 positions in 2017 based on the report of the *Euro Health Consumer Index* and is ranked 25th 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, while 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 a recognised destination for sustainable and health tourism with diversified and authentic tourism offer based on innovative business models and services.

SECTORAL GOALS

The introduction of innovative business models and services in the field of sustainable and health tourism
Applying and strengthening international quality standards for medical services

FOCAL AREAS AND TECHNOLOGIES

EXISTING

- Application of green and smart technologies in the sustainable nautical tourism in Montenegro;
- Standard and innovative therapeutic programmes for patients with: chronic non-communicable diseases, drug addicts;
- Advanced medical services: multidisciplinary diagnostics and dentistry;
- Standard and innovative rehabilitation programmes for: convalescents after orthopaedic interventions, neurological patients and athletes (balneotherapy, thalassotherapy, heliotherapy, salt therapy, psamotherapy, aerotherapy and mineral water therapy).

WITH POTENTIAL

- Application of research results from the field of sports to the offer in sports-recreational and wellness tourism;
- The use of advanced technologies in oncology within the regional project of establishing the South East European International Institute for Sustainable Technologies (SEEIIST) - Hadron Cancer Therapy and Biomedical Research with Protons and Heavy Ions;
- Production and development of pharmacotherapy using comparative advantages of Montenegro (healing and aromatic herbs, healing mud, sea wildlife);
- Application of nanomaterials in medicine;
- Nutritionism: programmes and supplements (use of food products that contribute to health improvement).

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

- Hotels and resorts, travel agencies, public and private health institutions, spa and wellness centres and pharmaceutical companies.

BUSINESS ASSOCIATIONS

- Chamber of Economy of Montenegro, Montenegrin Employers Federation, Montenegro Business Alliance, Montenegrin Medical Chamber, 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
Energy and sustainable environment	• 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 – E-health – Health tourism applications – Health information systems – Telemedicine • E-platforms and applications for tourist services – E-tourism – E-visitor – Applications using VR/AR • E-Montenegro model for high quality tourism

KEY PERFORMANCE INDICATORS

Indicator	2019.	2024.
Number of innovative business models and services in sustainable and health tourism	20	30
The share of the number of foreign arrivals in medical establishments in relation to the total number of arrivals	0,9%	2%

SWOT analysis

STRENGTHS	WEAKNESSES
• Diversity of the tourist offer (coastal, skiing, religious, cultural-historical and other types of tourism) • Natural factors and beauty of the country, as well as favourable climatological parameters • Level of ecological preservation of the environment • Safety of the country (Montenegro is a member of NATO) • Competitive offer (price, quality, etc.)	• Prominent seasonality and insufficient utilisation of the seasons • Lack of high-category hotels • Poor transport connections (both air and road) • Inadequate municipal waste management • Insufficient service staff to support the tourist offer • Inadequate statistics • Partially outdated existing healthcare equipment and technologies • Lack of accreditation and certification of the health institutions providing health tourism services • Insufficient development of the systemic national promotion of health tourism • Insufficient market orientation of health institutions • Inconsistency of the laws in the field of health and tourism
OPPORTUNITIES	**THREATS**
• Potential for year-round tourism offer • Extension of tourist seasons (summer and winter) • The proximity of the emitting European market, as well as the possibility of positioning in the markets of China, North America, and the Middle East • Development of road infrastructure • The use of advanced technologies in oncology (hadron therapy) and role of Montenegro in the regional project of the establishment of the South East European International Institute for Sustainable Technologies (SEEIIST) • Existing capacities in the field of rehabilitation medicine, in vitro fertilisation, dentistry, ophthalmology and aesthetic surgery • Human resources and good reputation in providing health services • Extending health insurance to preventive services	• Insufficiently fast development of the tourist offer • Inability to fill tourist capacities in areas dependent on seasonal trends by developing an alternative offer • Fast development of the medical technologies that imposes the need for constant high investment in human resources training and equipment

VI 4. 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 administration, 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[29], with intensive use of software and ICT services identified. In Montenegro, 98.5% of surveyed enterprises (2018)[30] 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, as well as 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 significant development and has begun to stand out as a separate economic branch that is not limited by 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 digital subscriber lines (DSL). The existence of modern telecommunication infrastructure is the basis for the development of many other economic areas and the entire society.

29 The Global Innovation Index 2018
30 Use of information and communication technologies in Montenegrin companies, 2018 – MONSTAT

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

Improvement in competitiveness of the ICT sector through innovative activities
Strengthening 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;
- 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

- Four major international telecom operators, as well as about 40 large and small and medium-sized enterprises, numerous micro and start-up companies, and few incubators have been identified.

BUSINESS ASSOCIATIONS

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

FLAGSHIP INITITIVE

Priority domain:	INFORMATION AND COMMUNICATION TECHNOLOGIES
Programme:	Digital Transformation

The Programme aims to ensure the reorganisation and improvement of business processes in priority areas of smart specialisation and public administration with the help of digital technologies. Digital transformation shall help reach the latest technological standards, develop the e-infrastructure and apply innovative ICT solutions at the state level in the following areas:

- ENERGY AND SUSTAINABLE ENVIRONMENT – Development of a smart city concept;
- SUSTAINABLE AGRICULTURE AND FOOD VALUE CHAIN - Agri-ICT;
- SUSTAINABLE AND HEALTH TOURISM - Digitalisation of cultural and natural heritage and its connection with tourist services;
- PUBLIC ADMINISTRATION – Building and improving digital services in order to increase efficiency and quality of services delivered by public administration, creating a digital identity of citizens at the state level, cyber security and open data as a basis for technological entrepreneurship.

PUBLIC INSTITUTIONS

- Ministry of Economy, Ministry of Science, Ministry of Public Administration, Ministry of Education and local self-government bodies.

CIVIL SECTOR

- NGOs

SYNERGISTIC EFFECT IN RELATION TO OTHER PRIORITY SECTORS

	ICT (horizontal priority sector)
Sustainable agriculture and food value chain	• Smart and efficient management of agriculture • Use of sensors for monitoring the environment and the production, storing and transport of food (bio-sensors, smart buoy, smart bee hive, etc.) • Centre of Excellence BIO-ICT
Energy and sustainable environment	• Optimum management of the electrical energy systems and networks • Managing data for smart use of energy sources or engaging network capacities • Cyber security • Smart energy systems – smart energy and information transportation • Smart trade and electrical energy management – energy market • Management of data regarding the potential and the state of affairs in the enegry sector • Development of a business intelligence system in the energy sector • Green ICT • Smart waste management
Sustainable and health tourism	• E-healthcare services – E-health – Health tourism applications – Health information systems – Telemedicine • E-platforms and applications for tourist services – E-tourism – E-visitor – Applications that use VR/AR – e-Montenegro model for high tourism

KEY PERFORMANCE INDICATORS[31]

Indicator	2019	2024.
ICT export (% of goods exports)	0.4%	0.7 %
Number of enterprises using e-commerce	24.1% [31] (2016)	45%

31 Action Plan for Implementation of the Strategy of Information Society of Montenegro by 2020 and the Report on the Implementation of the Action Plan for 2018, p. 25.
32 http://www.gov.me/ResourceManager/FileDownload.aspx?rid=355318&rType=2&file=12_116_04_04_2019.pdf

SWOT analysis

STRENGTHS	WEAKNESSES
• Good telecommunications' infrastructure • High percentage mobile telephony penetration • Presence of large ICT international companies • Possibility to effectively connect ICT companies • Small country suitable for the application and testing of the new technologies	• Education is not adapted to the market • A large number of start-ups register companies' headquarters abroad • Inaccessibility of founding capital for start-ups • Fragmented competence of state administration for IT sector • Lack of initiative in companies for digital transformation process • Strategic and statutory regulations not adequately applied
OPPORTUNITIES	**THREATS**
• Significant number of programmers and software engineers working independently • Stimulating policy in the field of taxation through incentives to establish new companies • Establishing a full service of international electronic payments that will enable the establishment of a competitive e-commerce system • Business environment that enables better connection and competition at the global level	• Outflow of ICT experts • Lack of IT awareness and literacy • Lack of strategic management in companies with regard to ICT (a reactive approach)

REGIONAL INITIATIVE – SEEIIST

S3.me priority sectors fit into a broader regional concept defined by the Macro Regional (Adriatic-Ionian) Smart Specialisation Strategy[33]. Smart specialisation requires specific stimulation policies, investments and projects, including projects based on large scale infrastructures. In this context, Montenegro is recognised as the initiator of establishment of the South East European International Institute for Sustainable Technologies – SEEIIST[2][34]. The initiative was formalised as a Regional project with the signing of a Declaration of Intent on 25 October 2017 at a Ministerial meeting at CERN, Geneva. The Signatory Parties were Albania, Bosnia and Herzegovina, Bulgaria, Kosovo*, Montenegro, Serbia, Slovenia and North Macedonia. Croatia joined 'ad referendum', while Greece took an observer status.

Reviewing common regional social and economic challenges and the need for high technologies, which is equivalent to a "Regional EDP process", a state-of-the-art "Facility for Tumour Therapy and Biomedical Research with Protons and Heavier Ions" was selected as the core of the SEEIIST Project. Tumour treatment with heavy particles like protons or carbon ions is the most modern and the most powerful method of treating many types of cancer, given that the radiation dose is deposited solely in the tumour region, thus protecting the normal cells. Heavier ions are unique even for the treatment of radio-resistant tumours. The latter method is still in the pioneering phase and requires extensive research. It is therefore planned to dedicate 50% of the beam time to research, which would make the SEEIIST project unique in the world and therefore an attractive and important facility for Europe as a whole.

The establishment of the facility will offer numerous opportunities for technology transfer to the South East European states. In particular, this will be a great benefit for the local industry, since the procurement and construction of certain technological components for the facility can be assigned to local industry. Moreover, the project will give rise to spin-offs and trigger complementary technologies, like boosting the use of green infrastructures. On top of that, the facility will also boost the creation of a powerful digital network and big data handling and cyber security. To reach the clinical and scientific goals, two networks will be set up, a Clinical and a Scientific Network. Capacity building and the prevention of brain drain would become immediate benefits. The SEEIIST project is now entering the Design Study Phase, thanks to the first financial support by the European Commission – Directorate General for Research and Innovation. Two renowned international research centres, CERN in Geneva and GSI-FAIR in Darmstadt, are providing generous support as hosts of the SEEIIST Design Study Phase. With the support of these institutions, the SEEIIST Project is now in the best hands, with great potential for success.

Up to EUR 200 million is required for the SEEIIST project, which would guarantee competitiveness in Europe. The project should be integrated into the general European plans for the development of the region and regional cooperation. The successful realisation of the SEEIIST project perfectly fits into the context of regional cooperation for smart specialisation. At the national level, the SEEIIST project incorporates all three strategic directions: healthy, sustainable and digitalised Montenegro.

33 OS-AI R pilot project; www.oisair.net
34 http://seeiist.eu/

VII POLICY MIX 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, digitalisation policy, agricultural development policy, energy policy, tourism policy, environmental protection policy, etc.

The identified thematic priorities will provide for financial support from both the state budget and from other available funds. Investing in research and innovation strengthens the existing production and technological capacities and creates new development directions in the economy, while stimulating competitiveness and the creation of highly qualified jobs. In this regard, the scientific research system and the innovation system need to contribute to the knowledge-based economy.

The S3 Strategy identifies the main common objectives of policy mix, determined by the interests related to research and innovation activity, and these are:

1. Improving excellence and relevance in scientific research activities;
2. Strengthening human resources in the field of research and innovation;
3. Enhancing collaboration within the innovation system;
4. Supporting innovative activities in the business sector;
5. Enhancing framework conditions for innovation ecosystem.

Priority domain specific goals, i.e. sectoral goals will be achieved by implementation of a combination of policy instruments and measures distributed throughout S3.me common policy mix goals. The attainment of these goals shall particularly be supported by exclusively sector oriented policy instruments. However, since the accomplishment of sectoral goals is primarily expressed through sectoral key indicators, these will be predominantly achieved through synergistic effects of different policy instruments.

VII 1. IMPROVING EXCELLENCE AND RELEVANCE IN SCIENTIFIC RESEARCH ACTIVITIES

In order for the scientific research capacities to be enhanced and used in an adequate manner, it is necessary to define and implement a model for improving the national scientific 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 the necessary equipment meeting the state-of-the-art technological standards. At the same time, open access needs to be provided for interested researchers to the research equipment in the possession of public institutions, under clearly determined professional standards and open-access policy that needs to be defined. This policy should also enable researchers to access scientific research literature, international publications, scientific databases and research-academic networks, in order for them to be able to follow global trends in science in a high-quality manner. Support to efficient research ecosystem will also be implemented through promotion of the national research infrastructure, via development of centres of excellence and grants for scientific research projects.

VII 2. STRENGTHENING HUMAN RESOURCES IN THE FIELD OF RESEARCH AND INNOVATION

Human resources are crucial for the successful implementation of S3.me, as they are the driver of economic and social development, which is why 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 awards for excellence in science and innovation. The employment programmes for PhD students, PhD degree holders and students of postdoctoral studies, primarily in the business sector, will stimulate the knowledge transfer and enable the acquisition of practical knowledge that will strengthen the innovation capacities of enterprises. In this way, development and research in the business sector will be enhanced, which will contribute to a more dynamic development of a knowledge-based economy.

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 encouraged 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 and technology strongly. In addition, international programmes will 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.

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 business sector in the national human capital and to attract investments from this sector.

VII 3. ENHANCING COLLABORATION WITHIN THE INNOVATION SYSTEM

The public and the business 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 economic 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 (STP). Furthermore, exchange of knowledge between the academic and the business sector and the use of innovative solutions will be stimulated through the establishment of a Technology Transfer Office, with a view to support development of new technologies and their commercialisation.

Special attention will be paid to the development of high-tech clusters by stimulating cooperation between SMEs on innovative projects. When it comes to supporting the cooperation between academic and business sectors, the attention will be given to mobility grants for doctoral students, with a view to develop innovative solutions in enterprises.

VII 4. SUPPORTING INNOVATIVE ACTIVITIES IN THE BUSINESS SECTOR

With a view to building a society based on knowledge and innovation, efforts will be focused on encouraging innovations in the business sector. Innovative companies represent the most dynamic and the most significant development potential of a modern economy. Through development of new products and new technologies, better business efficiency and competitiveness are provided. Main contribution to strengthening competitiveness will be made by supporting business sector innovative activities in S3.me priority domains. Direct financial support programmes in the form of grants for innovation, which envisage co-financing, will stimulate investments of the business sector in innovation, strengthening its competitiveness at the international level.

Particular attention will be devoted to creating new high-tech companies through the support programmes for development of start-up companies. In this context, support will also be provided to development of incubators and accelerator programmes (which accelerate development), with a view to facilitating the establishment of start-up and spin-off companies. Programmes for providing advisory services, mentoring, networking and trainings aimed at supporting innovative entrepreneurship will be organised.

VII 5. ENHANCING FRAMEWORK CONDITIONS FOR INNOVATION ECOSYSTEM

Creating a favourable eco-system for the development of innovative entrepreneurship is an important component of economic development. With a view to better protect intellectual property and its economic viability, it is necessary to work on further improvement of the legal and institutional framework. Inter alia, adequate support programmes for the protection of intellectual property, in particular patents, will be developed.

An attractive environment for innovative entrepreneurship will generally be provided by an innovative fiscal policy, primarily through tax incentives for investments in research and innovation and favourable customs treatment of equipment and materials intended for research. The programmes will also be implemented for attracting investments from the financial and private sector in the form of venture capital in start-ups and other innovative companies.

The development of broadband Internet and the establishment of a number of e-government services, including an open data initiative, will contribute to the development of digital entrepreneurship and the reduction of the digital gap. In particular, policy and legal measures will be supported to identify new technologies that lead to the creation of new economic sub-sectors and thereby modernisation of the economy. Activities promoting the benefits of innovation for the economy and society will be implemented through studies, workshops, conferences, exhibitions, publications, creativity competitions, etc.

Policy instruments within policy objectives are designed to have an impact on different levels. Firstly, there are policy instruments that impact particular S3.me priority domain in an attempt to further strengthen innovation capacities and competitiveness of that priority domain. Secondly, some policy instruments have an impact on two or more S3.me priority domains, producing positive synergistic effects. Thirdly, other policy instruments are horizontal and have an impact on all business sectors including S3.me priority domains. The role of the horizontal policy instruments is to strengthen research and innovation potential of all sectors, including S3.me priority domains. These instruments enable development of new emerging sectors over time and make continuous EDP process more dynamic.

A detailed description of the policy instruments within the policy objectives is presented in the Table 10.

Table 10 - Policy Mix

LEGEND:
● Sustainable agriculture and food value chain; ● Energy and sustainable environment; ● Sustainable and health tourism; ● ICT; ◐ All domains including S3.me priority domains; Note: Larger size of the circle represents dominance of the priority domain within policy instrument

FLAGSHIP INITIATIVES in S3.me domains: those policy instruments contributing to flagship initiatives are colour-highlighted.

Abbreviations: MoS – Ministry of Science, MoE – Ministry of Economy, MoEdu – Ministry of Education, MoPA – Ministry of Public Administration, MoARD – Ministry of Agriculture and Rural Development, MoSDT – Ministry of Sustainable Development and Tourism, MoH – Ministry of Health, MoF – Ministry of Finance, MoC - Ministry of Culture, MoLSW -Ministry of the Labour and Social Welfare, IDF – Investment and Development Fund.

NOTE: "Co-financing scheme" in the description means that private co-funding is a compulsory feature.

Policy Objective	Policy Instrument	Description	S3.me Priority Domain	Responsible entity (and partners)	Target groups (and other beneficiaries)
Improve excellence and relevance in scientific research activities	Competitive funding of research	Competitive grants provided to academic research institutions, universities, and public and private research institutions. The focus is on conducting basic research projects or research projects addressing a societal challenge, as well as, to a smaller extent, on involving companies or industry. This is a grant scheme.	◐	MoS	Consortia of research organisations; Research organisations
	Competitive funding for applied research in S3.me priority domains	Competitive grants provided for applied research in S3.me priority domains, to academic research institutions, universities, and public and private research institutions. This is a grant scheme.	● ● ● ●	MoS (MoE, MoARD, MoSDT, MoPA, MoH)	Consortia of research organisations; Research organisations
	R&D infrastructure	Support to the development of national research infrastructures (both general and tied to a specific programme) and to ESFRI – European Strategy Forum on Research Infrastructures. This is a grant scheme.	◐	MoS	Consortia of research organisations; Consortia of companies and research organisations; Research organisations
	Centres of Excellence	A centre of excellence is a structure where research and technology development is performed at a high standard, in terms of measurable scientific production (including training) and/or technological innovation. This is a co-financing scheme.	◐	MoS	Consortia of research organisations; Consortia of companies; Research organisations
Strengthening human resources in the field of research and innovation	Support for PhD students	Measures that support the development of human resources for research such as grants to support research in specific fields. This is a grant scheme.	◐	MoS	Research organisations
	Support for post-doctoral students	Measures that support the development of human resources for research within post-doctoral programmes. This is a grant scheme.	◐	MoS	Research organisations
	Grants strengthening participation in international initiatives	Measures that support researchers and entrepreneurs to participate in international networks, especially in EU initiatives. This is a grant scheme.	◐	MoS, MoE	Research organisations; Enterprises
	Science promotion communication activities	Events, awards, open days and other activities that promote research and science communication. Grant and co-financing scheme.	◐	MoS, MoEdu	Research organisations (NGOs)
	Development of qualifications and educational programmes	Support to developing qualifications and entrepreneurship skills of researchers, professionals. This is a grant scheme.	◐	MoEdu. MoH	Research organisations (Enterprises)
	Development of professional skills in line with future needs	Lifelong learning, support to vocational training with an innovation dimension, support to innovation management training for staff in enterprises. This is a co-financing scheme.	● ● ● ●	MoEdu, MoLSW	Enterprises
Enhancing the collaboration within the innovation system	Cluster development programme for S3.me priority domains	All policy initiatives specifically aimed at promoting cluster development and providing support to cluster management at national level. This is a co-financing scheme.	◐	MoE	Enterprises (Research organisations)

	Technology transfer office	Support given to establish and operate structures and mechanisms to encourage the transfer of know-how and technology from research to business: funding of technology transfer offices and other structures for knowledge transfer between academia and industry. This is a grant scheme.		MoS	Research organisations; Enterprises; Start-ups
	Science and technology parks	Science and technology parks aim to establish concentrations of firms in a particular area. It is a property-based initiative that has a high-quality physical environment, is located at a reasonable distance from a university or research institute, and emphasises activities encouraging the formation and growth of a range of research, new technology or knowledge-based enterprises. This is a grant scheme.		MoS	Enterprises (Research organisations, Start-ups)
	Collaborative innovation programmes	Measures to support innovative projects conducted through intensive cooperation between innovation system actors. This is a co-financing scheme.		MoS	Consortia of companies; Research organisations
	Genetic research and innovation programme[35]	Support to the research and innovation activities including the selection of genotypes from autochthonous populations of plant species and enriching the database on genetic resources and creating a platform for innovation and commercial cultivation of domestic and autochthonous species / varieties / races, which should be one of the ways for recognition of Montenegrin agricultural products and their quality components on the international market. This is a co-financing scheme.		MoARD	Research organisations; Enterprises

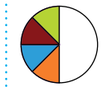
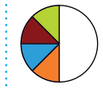
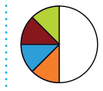
35 Linked to the Flagship Initiative for Sustainable agriculture and food value chain.

Supporting innovative activities in the business sector	Support to start-ups through grants	Support provided to the creation of start-ups, from idea to the market. This is a co-financing scheme.		MoS (MoE)	Start-ups
	Grant scheme for mobility between academia and business sector	Support provided to encourage the recruitment of researchers by enterprises. This is a co-financing scheme.		MoS	Enterprises
	Grant scheme for engagement of university graduates in the business sector	Support for engagement of university graduates in the business sector. This is a co-financing scheme.		MoEdu	Enterprises
	Grant scheme for innovative activities in organic agriculture	Support to improvement and transition from traditional to organic farming by using innovative approaches. This is support to sustainable management of natural resources by reducing the negative impacts of agriculture on the environment and conservation of biodiversity while raising the quality of agricultural products. This is a co-financing scheme.		MoARD	Enterprises
	Grant scheme for higher-stage industrial processing and market placement	Strengthening investment in higher-stage industrial processing and market placement through grants (IPARD programme and IPARD-like projects, etc.), as well as manufacturing industry modernisation. This is a co-financing scheme.		MoARD MoE	Enterprises
	Programmes of energy efficiency and renewable energy sources[36]	Establishment and implementation of financial support mechanisms for rational use of energy resources in business, based on the principles of environmental protection, improved energy efficiency and greater use of renewable energy sources. This is a co-financing scheme.		MoE	Enterprises
	Innovation vouchers schemes	Support to companies to access knowledge resources in research centres (public, private). This is a co-financing scheme.		MoE	Enterprises (Start-ups)

36 Linked to the Flagship Initiative for Energy and sustainable environment.

	Business and technology advisory service scheme	Support to access specialised services that can guide companies to better alignment of their business models and technological capabilities with their strategic and operational objectives, with a focus on how to maximise the value of the investment. This is a co-financing scheme.		MoE	Enterprises (Start-ups)
	Incubators and accelerators programmes	Support to the establishment and strengthening of incubators and accelerators programmes. This is a grant scheme.		MoS	Start-ups
	R&D tax incentives	Tax credits aimed at fostering investment in research and development.		MoF	Enterprises; Research organisations; Start-ups
	Support scheme for digital transformation of companies[37]	Support to digital transformation, i.e. the adoption of digital processes and tools to achieve strategic business goals. This is a complex, multifaceted process that brings a cultural shift in the workplace and changes every part of an organisation. This is a co-financing scheme.		MoPA	Enterprises (Start-ups)
	Environment protection and waste management programme[38]	Support measures that address new technologies in the field of environment protection and waste management with a special focus on ecological black spots. This is a co-financing scheme.		MoSDT	Enterprises (Research organizations)
	Support scheme for innovative health tourism services[39]	Support measures that create a new and innovative business model (process) for entrepreneurs to fulfil the special needs of patients and their families in the field of health tourism. This is a co-financing scheme.		MoSDT, MoH	Enterprises (Start-ups)

37 Linked to the Flagship Initiative for ICT.
38 Linked to the Flagship Initiative for Energy and sustainable environment.
39 Linked to the Flagship Initiative for Sustainable and health tourism.

Enhancing framework conditions for innovation ecosystem	Strengthening innovation culture	Funding of activities aimed at promoting awareness of the benefits of innovation to the economy and society and at encouraging an innovation culture. Activities supported could include: studies, surveys and dissemination of the results, workshops, conferences, exhibitions, networks, publications, broadcasting, competitions for creativity, innovation or new venture awards, etc. This is a grant scheme.		MoS, MoE (MoARD, MoSDT, MoPA, MoH)	Enterprises; Research organisations; Start-ups; Organisations and associations of the civil sector
	Support to creation of e-government and open data services	Support measures that address importance of digital economy and introduction of an array of e-government and open data services. This is a grant scheme.		MoPA	Citizens; (Enterprises, Research organisations, Start-ups, Organisations and associations of the civil sector)
	Intellectual property rights (IPR) support and promotion	Support provided (including provision of information) through open days, workshops, trainings for patents, trademarks, copyright, design rights and their commercial exploitation. This is a grant scheme.		MoE	Enterprises; Research organisations; Start-ups
	Financial instruments (loans, equities and guarantees)	Subsidised loans, guarantees, support to private equity, etc.		MoF, IDF	Enterprises; Start-ups
	Support to venture capital	Public funding provided to private (or public-private) financial service providers with a view to leveraging an increased private investment into innovation activities of existing enterprises, including guarantee mechanisms (development stage capital).		MoE, IDF	Enterprises; Start-ups
	Public procurement of innovative products and services	The aim is to improve public procurement practices, promote the demand for innovative goods and services, and foster innovation.		MoF	Enterprises; Start-ups

	Strategic and legal framework for new technologies and sub-sectors	Support to strategic and legal measures that address new and emerging technologies that lead to creation of new sub-sectors (electric mobility, health tourism, fintech, etc.)		MoE, MoSDT, MoH, MoPA, MoF	Enterprises; Research organisations; Start-ups
	Health Technology Assessment (HTA) Programme	Support measures that address the systematic evaluation of the properties, effects, and/or impacts of innovative health technology. The purpose is to address the direct, indirect, intended, and unintended benefits and consequences of the adoption of healthcare technology. This is a co-financing scheme.		MoH	Enterprises; Public health institutions
	Support to entrepreneurship in creative industries	Support measures for creative industries. Creative industries encompass a broad range of activities, including cultural industries and cultural or artistic production. There is an increasing convergence between business services and creative industries through the use of ICT. This is a co-financing scheme.		IDF, MoC	Enterprises

A description of the context indicators that measure broader social, economic and environmental context in which policy objectives are operating is presented in Table 11.

Table 11 – Overview of context indicators

No.	CONTEXT INDICATOR	2019	2024
1	New PhD graduates	30[40]	40
2	Population that completed tertiary education	33%[41]	50%
3	Lifelong learning	3,3%[42]	5.5%
4	International scientific co-publications	1520[43]	2500
5	Scientific publications in the top 10% most cited	5.7%[44]	7%
6	Broadband penetration	10,5%[45]	14%
7	R&D expenditure in the public sector	0.23%[46]	0.33%
8	R&D expenditure in the business sector	0.05[47]	0.09
10	Employment in knowledge-intensive activities	11.4%[48]	15%
11	ICT share in GDP	4%[49]	6%
12	Share of agriculture in GDP	7%[50]	9%
13	Share of renewable energy sources in total final energy consumption	33%[51]	45%
14	Direct share of tourism in GDP	7%[52]	12%

40 Ministry of Science.
41 Ministry of Economy.
42 2016, Eurostat: trng_lfs_01.
43 Matusiak M. (ed.), Smart specialisation in the Western Balkans – potential for knowledge-based economic transformation, European Commission, Joint Research Centre (draft report to be published in 2019).
44 2015, UNESCO Science Report.
45 2017, Monstat: Use of ICT in Montenegrin Enterprises.
46 2016, Ministry of Science.
47 2016, Ministry of Science.
48 2016, Eurostat: htec_kia.
49 2017, National accounts statistics does not include the data on ICT share in GDP. The data on the share of NACE J activity of ICT in GDP is available on MONSTAT's website, at the following link: https://www.monstat.org/cg/page.php?id=19&pageid=19
50 2017, Data on the share of NACE A activity of Agriculture, Forestry and Fisheries in the total GDP is available on MONSTAT's website, at the following link: https://www.monstat.org/cg/page.php?id=19&pageid=19
51 Ministry of Economy.
52 2017, National accounts statistics does not include the data on the share of tourism in GDP. The data on the share of NACE I activity of Accommodation and Food Services in the total GDP is available on MONSTAT's website, at the following link: https://www.monstat.org/cg/page.php?id=19&pageid=19

VII 6. FINANCIAL FRAMEWORK

For the period from 2019 to 2024, the Smart Specialisation Strategy will serve as the foundation for priority specific investments in research, innovation and development. In this period, investments in the amount of about EUR 174 million are planned. Of the total planned funds, EUR 116.5 million will be provided from the budget, while the private sector investments are projected at EUR 21.7 million. Around EUR 33.5 million is expected from the EU funds, with around EUR 2.5 million expected from other international organisations and programmes.

EU funding is based on IPA funds that are planned until 2020 due to allocation of these funds at a national level. After 2020, IPA funds allocation will be managed at the WB6 regional level; hence, funds will not be allocated per country but through a competitive process between the WB6 countries. Therefore, funds allocation is not possible to predict after 2020. However, projects that are programmed until 2020 will use the N+5 rule; therefore, implementation of the projects will take place until 2025, so it is possible to predict the available funds in this period. For IPA programming financial allocation, for selected sectors, in the period of 2014-2020, see Table 12:

Table 12 – IPA II – indicative allocations (2014-2020)

IPA II	2014	2015	2016	2017	Total 2014-2017	2018	2019	2020	Total 2018-2020	TOTAL 2014-2020 (EUR million)
Competitiveness and growth	11.1	10	32.9	11.3	65.3	25.5	39.2	26.6	91.3	156.6
Environment, climate change and energy	2.8	0	16	0	18.8		16.3		16.3	35.1
Competitiveness, innovation, agriculture and rural development	8.3	5	11.9	6	31.2	17.5	8	14.9	40.4	71.6
Education, employment and social policy	0	5	5	5.3	15.3	8		11.7	19.7	35

In addition, within the financial perspective 2014-2020, Montenegro participates, on a competitive basis, in 9 IPA cross-border and transnational cooperation programmes (Table 13).

Table 13 – IPA cross-border and transnational cooperation programmes

Programme	Programme priorities	TOTAL 2014-2020 in EUR million
Bilateral cross-border cooperation programme Montenegro – Albania	- Promoting tourism and cultural and natural heritage - Protecting the environment, promoting climate change adaptation and mitigation, risk prevention and management - Promoting employment, labour mobility and social and cultural inclusion across the border	13.8
Bilateral cross-border cooperation programme Montenegro – Kosovo	- Promoting employment, labour mobility and social and cultural inclusion across the border - Protecting the environment, promoting climate change adaptation and mitigation, risk prevention and management - Promoting tourism and cultural and natural heritage	9.73
Bilateral cross-border cooperation programme Bosnia and Herzegovina – Montenegro	- Promoting employment, labour mobility and social and cultural inclusion across the border - Protecting the environment, promoting climate change adaptation and mitigation, risk prevention and management - Promoting tourism and cultural and natural heritage	9.73
Bilateral cross-border cooperation programme Serbia – Montenegro	- Promoting employment, labour mobility and social and cultural inclusion across the border - Protecting the environment, promoting climate change adaptation and mitigation, risk prevention and management - Promoting tourism and cultural and natural heritage	9.73
Trilateral Interreg IPA Cross-border Cooperation Programme: Croatia, Bosnia and Herzegovina and Montenegro	- Improving the quality of the services in public health and social care sector - Protecting the environment and biodiversity, improving risk prevention and promoting sustainable energy and energy efficiency - Contributing to the development of tourism and preserving cultural and natural heritage - Enhancing competitiveness and developing business environment in the programme area	67
Trilateral Interreg IPA Cross-border Cooperation Programme: Italy, Albania and Montenegro	- Strengthening the cross-border cooperation and competitiveness of SMEs - Smart management of natural and cultural heritage for the exploitation of cross border sustainable tourism and territorial attractiveness - Environmental protection, risk management and low carbon strategy - Increasing cross border accessibility, promoting sustainable transport service and facilities and improving public infrastructures	93
Danube Transnational Programme	- Innovative and socially responsible Danube Region - Environment and Culture responsible Danube Region - Better connected Danube Region - Well-governed Danube Region	19.8

Mediterranean Transnational Programme (MED)	- Promoting Mediterranean innovation capacities to develop smart and sustainable growth	250
	- Fostering low-carbon strategies and energy efficiency in specific MED territories	
	- Protecting and promoting Mediterranean natural and cultural resources	
	- Enhancing Mediterranean governance	
Adriatic-Ionian Transnational Programme (ADRION)	- Innovative and smart region	15.7
	- Sustainable region	
	- Connected region	
	- Supporting the governance of the EUSAIR	

The plan is to allocate a portion of these funds to research and innovation projects in the S3.me priority domains. Private sector contribution and investments are leveraged mostly by way of co-financing programmes that are an integral part of the policy mix instruments. Co-financing is an excellent mechanism to enable the private sector to play a pivotal role in the implementation of S3.me strategy and ensures it's commitment to development of a knowledge-based economy. The indicative amounts of funds necessary for implementation of all planned and allocated programmes and projects are presented in the S3 Financial Framework (Table 14).

Table 14 – Financial framework for S3 (2019–2024)

Policy Objective	Policy Instrument	MoS	MoE	MoEdu	MoARD	MoSDT	MoPA		MoH	MoC	MoLSW	MoF	IDF	Private sector	EU grants	International donations	Amount in euros
Improving excellence and relevance of scientific research activities	Competitive funding of research	4,000,000															4,000,000
	Competitive funding for applied research in S3.me priority domains	600,000	500,000		300,000	300,000	300,000		300,000						300,000		2,600,000
	R&D infrastructure	800,000		400,000	95,000										100,0000	1,000,000	3,295,000
	Centres of Excellence	1,800,000												200,000			2,000,000
Strengthening human resources in the field of research and innovation	Support for PhD students	1,200,000															1,200,000
	Support for post-doctoral students	300,000															300,000
	Communication activities for science promotion	1,200,000		100,000			50,000		50,000						100,000	50,000	1,550,000
	Support grants to strengthening participation in international initiatives	7,050,000	750,000	180,000										102,600	444,0000	100,000	12,622,600
	Development of professional skills in line with future needs	420,000	360,000	2,580,000	180,000	1,800,000			8,000,000		300,000			200,000	800,000		14,640,000
	Development of qualifications and educational programmes			2,100,000										360,000	420,000		2,880,000
Enhancing collaboration within the innovation system	Cluster development programme for S3.me priority domains		600,000		960,000									634,216			2,194,216

Policy Objective	Policy Instrument	MoS	MoE	MoEdu	MoARD	MoSDT	MoPA		MoH	MoC	MoLSW	MoF	IDF	Private sector	EU grants	International donations	Amount in euros
	Genetic research and innovation programme				240,000									60,000			300,000
	Collaborative innovation programmes	3,750,000												2,000,000	250,000		6,000,000
	Technology Transfer Office	150,000													20,000		170,000
	Science and technology parks	8,300,000												100,000		20,000	8,420,000
Supporting innovative activities in the business sector	Business and technology advisory services		3,306,000		360,000									144,0000	1,360,000	560,000	7,026,000
	Start-up grant support programmes	2,690,000	300,000		1,250,000		72,000				500,000			100,000	3,000,000	200,000	8,112,000
	Innovation voucher schemes		300,000											300,000			600,000
	Incubators and accelerators programmes	1,500,000	990,000											500,000	500,000	240,000	3,730,000
	Grant scheme for mobility between academia and business sector	500,000	500,000											300,000	1,000,000		2,300,000
	Grant scheme for engagement of university graduates in the business sector			30,240,000										1,728,000			31,968,000
	Grant scheme for higher-stage industrial processing and market placement		1,200,000		5,500,000									9,000,000	16,500000		32,200,000
	Energy efficiency and renewable energy sources programme		1,000,000											500,000	500,000	250,000	2,250,000
	R&D tax incentives											2,000,000					2,000,000
	Support scheme for digital transformation of companies		100,000				60,000							200,000	310,000		670,000
	Support scheme for innovative health tourism services					100,000			100,000					100,000	250,000		550,000

Policy Objective	Policy Instrument	MoS	MoE	MoEdu	MoARD	MoSDT	MoPA		MoH	MoC	MoLSW	MoF	IDF	Private sector	EU grants	International donations	Amount in euros
	Environment protection and waste management programme					1,000,000									500,000		1,500,000
	Grant scheme for innovative activities in organic agriculture				1,200,000									2,400,000	250,000		3,850,000
Enhancing framework conditions for innovation ecosystem	Strengthening innovation culture	636,000	390,000	100,000		100,000	100,000		100,000					684,000	200,000		2,310,000
	IPR support and promotion	20,000	500,000											24,000			544,000
	Financial instruments (loans, equities and guarantees)												3,210,000				3,210,000
	Support to venture capital												126,000		90,000	30,000	246,000
	Support to creation of e-government and open data services	50,000				200,000	720,000					1,800,000			1,510,000		4,280,000
	Strategic and legal framework for new technologies and sub-sectors	100,000	200,000		300,000	200,000	270,000		100,000			210,000			30,000	50,000	1,190,000
	Support to entrepreneurship in creative industries									1,380,000			100,000	600,000	180,000		2,260,000
	Public procurement of innovative products and services	5,000										100,000					105,000
	Health Technology Assessment Programme								1,000,000					200,000			1,200,000
TOTAL		35071000	10996000	35700000	10115000	3700000	1572000		9650000	1380000	800000	4110000	3436000	21708816	33534000	2500000	174272816

VIII MONITORING AND EVALUATION

Particularly important for the successful implementation of the Smart Specialisation Strategy are the implementation control mechanisms. For this purpose, the Monitoring Plan (Table 15) has been prepared for monitoring the accomplishment of the set goals and activities.

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 prepared and submitted to the Government for adoption separately in the coming period. The Action Plan will define in detail all the relevant elements in relation to the S3 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 per proponents of individual activities).

A special segment of monitoring the success of the implementation of the S3 will be an evaluation that will look at its relevance, efficiency and impact of the defined measures on achieving strategic goals. As part of the evaluation process, Conclusions on the Success of Implementation will be made, with Recommendations for Changing and Improving Planning (Figure 18).

Figure 18 – Continuous S3 monitoring and improvement

According to the plan, a mid-term evaluation will be conducted by external evaluators. In line with recommendations of the European Commission, at least one evaluation will be conducted during the implementation of the Strategy, with more evaluations possible if needed. External evaluation will be financed from international funds, primarily IPA pre-accession funds.

The *National Office for Smart Specialisation* will work at the operational level and will be responsible for implementation and monitoring, while external evaluation will be conducted by independent experts. 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 preparation and based on the Entrepreneurial Discovery Process. Measurable S3 indicators have been identified in Table 14. 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 upon the realisation of individual activities and projects of the competent institutions, as well as upon the achievement of the objectives, i.e. the results, the output and the outcome indicators, which will form the basis for the *Annual Implementation Reports* that are submitted to the Government for adoption. 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.

If this is necessary, it will be possible to revise the S3 even before the end of the period for which it has been adopted, based on the:

- results of S3 implementation reflected through the 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 business entities and associations),

The S3 revision process is entrusted to the *Council for Smart Specialisation*, in cooperation with the Ministry of Science and the Ministry of Economy.

All the activities related to the management, monitoring, evaluation, revision and open dialogue within the continuous entrepreneurial discovery process will be conducted transparently, and their overview will be available to the public via the website of the National Office for Smart Specialisation.

Table 15 –Monitoring plan

Policy Objective	Policy Instrument	S3.me Priority Domain	Responsible entity (and partners)	Target groups (and other beneficiaries)	Input indicators (= funds allocated) (NF – national, EU grants, PF – private funds, ID – international donors)	Output indicators	Outcome indicators (reporting period)
Improving excellence and relevance in scientific research activities	Competitive funding of research		MoS	Consortia of research organisations, Research organisations	NF	1. Number of researchers supported through competitive grants for research projects 2. Number of projects supported	1. Number of indexed publications with Montenegrin authors (2 years) 2. Funds obtained from international sources (3 years)
	Competitive funding for applied research in S3.me priority domains		MoS MoE MoARD MoSD MoH MoPA	Consortia of research organisations, Research organisations	NF	1. Number of researchers supported through competitive grants for research projects 2. Number of projects supported	1. Number of indexed publications with Montenegrin authors (2 years) 2. Funds obtained from international sources (3 years)
	R&D infrastructure		MoS	Consortia of research organisations, Consortia of companies and research organisations, Research organisations	NF, EU, ID	1. Number of new or improved research infrastructures 2. Number of new equipment pieces	1. Number of indexed publications with Montenegrin authors (4 years)
	Centres of Excellence		MoS	Consortia of research organisations, Consortia of companies and research organisations	NF, PF	1. Number of new CoEs 2. Number of researchers engaged in CoEs	1. Number of indexed publications with Montenegrin authors (2 years) 2. Funds obtained from international sources (3 years) 3. Number of new initiatives (spin-offs, patents, service contracts, innovations, licencing agreements) (4 years)
Strengthening human resources in the field of research and innovation	Support for PhD students		MoS	Research organisations	NF	1. Number of awarded scholarships for PhD candidates in the academic and business sector 2. Number of small grants at doctoral competitions	1. Number of new holders of PhD degree (4 years)

	Support for post-doctoral students		MoS	Research organisations	NF	1. Number of post-doctoral students supported	1. Number of indexed publications with Montenegrin authors (2 years)
	Support grants for strengthening participation in international initiatives		MoS	Research organisations (Enterprises)	NF, EU, ID	1. Number of researchers and entrepreneurs involved in international projects	1. Number of projects submitted to international calls (1 year) 2. Number of projects approved under international calls (2 years)
	Communication activities for science promotion		MoS MoEdu	Research organisations (NGOs)	NF, EU, ID	1. Number of events	1. Number of participants (1 year)
	Development of qualifications and educational programmes		MoEdu MoH	Research organisations (Enterprises)	NF, EU, PF	1. Number of improved or new programmes	1. Number of people with improved education and qualifications (4 years)
	Development of professional skills in line with future needs		MoEdu	Enterprises	NF, EU, PF	1. Number of new programmes in S3.me priority domains	1. Number of people with improved qualifications in S3 .me priority domains (3 years)
Enhancing collaboration within the innovation system	Cluster development programme for S3.me priority domains		MoE	Enterprises (Research organisations)	NF, EU, PF	1. Number of projects in the clusters 2. Number of new cluster members in existing clusters	1. The growth of number of new products and services per S3.me priority domain (3 years)
	Technology transfer office		UCG MoS MoEdu	Research organisations (Enterprises, Start-ups)	NF, EU	1. Number of organisations involved in TTO 2. Number of TTO initiatives	1. Number of licenses, TT agreements, patents or copyrights, spin offs (3 years)
	Science and technology parks		MoS	Enterprises (Research organisations, Start-ups)	NF, PF	1. Number of the companies - tenants in the STP 2. Number of STP user services	1. New innovative initiatives by S3.me priority domain (2 years) 2. New business initiatives by S3.me priority domain (3 years)
	Collaborative innovation programmes		MoS	Consortia of enterprises and research organisations	NF, PF	1. Number of enterprises cooperating with research institutions by S3.me priority domain 2. Private investment matching public support to enterprises by S3.me priority domain	1. Number of innovative products, services and processes (2 years) 2. Number of innovative products, services and processes by S3.me priority domain (2 years)

	Genetic research and innovation programme		MoARD	Research organisations, Enterprises	NF, PF	1. Number of projects 2. Number of research organisations involved 3. Number of enterprises involved	1. Number of innovative and autochthonous products in Agri-food S3.me priority domain (3 years) 2. Number of innovative companies in agri and organic production (4 years)
Support to innovative activities in the business sector	Support to start-ups through grants		MoS MoE	Start-ups	NF, PF	1. Number of grants allocated	1. Number of innovative companies (5 years) 2. Survival rate of new companies after 5 years
	Grant scheme for mobility between academia and business sector		MoS	Enterprises	NF, EU, PF	1. Number of grants allocated 2. Number of enterprises involved 3. Companies' own investments	1. Number of researchers retained by enterprises (3 years)
	Grant scheme for engagement of university graduates in the business sector		MoEdu	Enterprises	NF, PF	1. Number of grants allocated 2. Number of enterprises involved	1. Number of trainees retained by enterprises (2 years)
	Grant scheme to innovative activities in organic agriculture		MoARD	Enterprises	NF, PF	1. Number of grants allocated 2. Number of enterprises supported 3. Companies' own investments	1. Number of innovative products, services and processes (3 years)
	Grant scheme for higher-stage industrial processing and market placement		MoARD	Enterprises	NF, EU, PF	1. Number of enterprises using grant support. 2. Value of equipment procured.	1. Number of new food products, processes and marketing activities (3 years)
	Energy efficiency and renewable energy sources programmes		MoE	Enterprises	NF, EU, PF, ID	1. Number of grants allocated 2. Number of enterprises supported 3. Companies' own investments	1. Number of innovative processes and products (3 years)
	Innovation voucher schemes		MoE	Enterprises (Start-ups)	NF, PF	1. Number of voucher schemes granted 2. Number of companies supported through voucher schemes 3. Companies' own investments	1. Number of innovative products, services and processes (2 years)
	Business and technology advisory service scheme		MoE	Enterprises (Start-ups)	NF, EU, ID, PF	1. Number of advisers supported	1. Number of enterprises using B&T advisory services (2 years) 2. Number of innovative products, services and processes (3 years)

	Incubators and accelerators programmes		MoS	Start-ups	NF, PF	1. Number of incubators supported 2. Number of new start-ups in incubators 3. Number of companies using acceleration programme	1. Number of new innovative companies (5 years) 2. Survival rate of new companies after 5 years
	Providing R&D tax incentives		MoF	Enterprises, Research organisation, Start-ups	NF	1. Number of companies supported 2. Amount of tax incentives	Number of innovative products, services and processes (5 years)
	Support scheme for digital transformation of companies		MoPA	Enterprises (Start-ups)	NF, EU, PF	1. Number of companies supported 2. Number of grants allocated 3. Companies' own investments	1. Number of companies that digitally transformed their business practices and services (3 years)
	Environment protection and waste management programme		MoSDT	Enterprises (Research organisations)	NF, PF, EU	1. Number of projects supported 2. Number of companies or consortia involved in programmes 3. Companies' own investments	1. Number of innovative solutions in circular economy (3 years)
	Support scheme for innovative health tourism services		MoSDT, MoH	Enterprises (Start-ups)	NF, PF	1. Number of projects supported 2. Number of enterprises involved in programmes 3. Companies' own investments	1. Number of innovative solutions in health tourism (3 years)
Enhancing framework conditions for innovation ecosystem	Strengthening innovation culture		MoS, MoE, (MoARD, MoSDT, MoPA)	Enterprises, Research organisations, Start-ups, Organisations and associations of the civil sector	NF, EU, ID	1. Number of organised manifestations at national and international level	1. Number of participants (1 year)
	Support to creation of e-government and open data services		MoPA	Citizens, (Enterprises, Research organisations, Start-ups, Organisations and associations of the civil sector)	NF, EU	1. Number of enterprises involved in development of e-services 2. Number of open data sets	1. Number of new e-services created (2 years) 2. Number of new applications by enterprises, based on open data (2 years)
	IPR support and promotion		MoE	Enterprises, Research organisations (Start-ups)	NF	1. Number of organised manifestations at national and international level 2. Number of grants allocated	1. Number of new IPR applications (3 years) 2. Number of new IPR applications (3 years)

Financial instrument (loans, equities and guarantees)		MoF, IDF	Enterprises, Start-ups	NF	1. Amount of loans granted for innovative projects 2. Number of loans granted for innovative projects 3. Number of guarantees granted for innovative projects	1. Number of innovative products, services and processes (3 years)
Support to venture capital		MoE, IDF	Enterprises, Start-ups	NF, EU	1. Number of innovative companies supported through venture capital	1. Number of innovative products, services and processes (3 years)
Public procurement of innovative products and services		MoF	Enterprises, Start-up	NF	1. Number of tenders for public procurement of innovative products and services 2. Number of enterprises applying to tenders	1. Number of innovative products, services and processes (4 years)
Strategic and legal framework for emerging technologies and sub-sectors		MoE, MoSDT, MoH, MoPA, MoF	Enterprises, Research organisations, Start-ups	NF	1. Number of policy documents initiated	1. Number of policy documents adopted (3 years)
Health Technology Assessment (HTA) Programme		MoH	Enterprises, Public health institutions	NF, PF	1. Number of HTAs performed 2. Number of organisations involved	1. Number of new health procedures approved (3 years)
Grant scheme to enterprises in Creative Industries		IDF, MoC	Enterprises	NF, EU	1. Number of loans 2. Amount of loans 3. Number of companies supported	1. Number of innovations in creative industries (3 years)

IX ANNEX 1

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, 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 in total employment in EU. 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.

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 are 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%.

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[53] (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.

53 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.

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 clusters are 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.

IX ANNEX 2

ENTREPRENEURIAL DISCOVERY PROCESS

The S3 webpage on the website of the Ministry of Science contains detailed information on the Entrepreneurial Discovery Process and is available on the following links:
In Montenegrin:
http://www.mna.gov.me/ministarstvo/Strategija_pametne_specijalizacije/
In English:
http://www.mna.gov.me/en/ministry/Smart_Specialisation/

Table A — Workshops, trainings and meetings organised during the EDP process

Workshops, trainings and meetings organised during the EDP process				
No.	Date	Sector/ Priority	Location	Number of participants
1	11-12 April 2018	EDP training	Ljubljana	8
2	11 May 2018	Metal industry	Podgorica	11
3	11 May 2018	Health and quality of life	Podgorica	23
4	11 May 2018	Construction	Podgorica	18
5	11 May 2018	Tourism	Podgorica	13
6	11 May 2018	Energy	Podgorica	20
7	11 May 2018	Agriculture	Podgorica	21
8	11 May 2018	Information and Communication Technologies (ICT)	Podgorica	25
9	7 June 2018	Health and quality of life and tourism	Podgorica	34
10	8 June 2018	Energy	Podgorica	30
11	20 June 2018	ICT	Podgorica	27
12	21 June 2018	Agriculture	Podgorica	25
13	22 June 2018	Construction and metal industry	Podgorica	31
14	3 July 2018	Joint meeting of the EDP focus groups	Podgorica	21
15	6 July 2018	Health Tourism	Podgorica	9
16	10 July 2018	Sustainable and Health Tourism	Podgorica	12
17	12 July 2018	Sustainable agriculture and food value chain	Podgorica	12
18	16 July 2018	ICT	Podgorica	7
19	17 July 2018	Health Tourism	Podgorica	16
20	19 July 2018	Renewable energy sources	Podgorica	4
21	20 July 2018	Sustainable and Health Tourism	Budva	9
22	24 July 2018	Sustainable and Health Tourism	Podgorica	3
23	25 July 2018	Health Tourism	Podgorica	11
24	25 July 2018	Sustainable and Health Tourism	Podgorica	3
25	26 July 2018	Sustainable agriculture and food value chain	Podgorica	7
26	30 July 2018	ICT	Podgorica	7
27	31 July 2018	Health Tourism	Podgorica	7
28	1 August 2018	New materials and sustainable technologies	Podgorica	9
29	16 August 2018	Health Tourism	Podgorica	6
30	24 August 2018	Health Tourism	Podgorica	7
31	28 August 2018	New materials and sustainable technologies	Podgorica	18
32	28 August 2018	ICT	Podgorica	17
33	28 August 2018	Renewable energy sources	Podgorica	19
34	28 August 2018	Sustainable agriculture and food value chain	Podgorica	16
35	29 August 2018	Sustainable and Health Tourism	Podgorica	30
36	5 September 2018	Sustainable agriculture and food value chain	Podgorica	5
37	5 September 2018	ICT	Podgorica	7
38	6 September 2018	New materials and sustainable technologies	Podgorica	11
39	6 September 2018	Energy	Podgorica	6
40	7 September 2018	Sustainable and Health Tourism	Podgorica	15
41	12 September 2018	Interagency working group		20
42	18 September 2018	New materials and sustainable technologies	Podgorica	10
43	18 September 2018	ICT	Podgorica	19
44	18 September 2018	Renewable energy sources	Podgorica	18
45	18 September 2018	Sustainable agriculture and food value chain	Podgorica	13
46	18 September 2018	Sustainable and Health Tourism	Podgorica	20
47	12 October 2018	New materials and sustainable technologies	Podgorica	7
48	12 October 2018	ICT	Podgorica	9
49	12 October 2018	Renewable energy sources	Podgorica	7
50	12 October 2018	Sustainable agriculture and food value chain	Podgorica	7
51	12 October 2018	Sustainable and Health Tourism	Podgorica	8
52	22 October 2018	Interagency working group	Podgorica	17
53	6-8 November 2018	Multi-Country Workshop – Training for National and Regional Smart Specialisation Teams in Enlargement and Neighbourhood Countries.	Brussels	4
54	3 December 2018	Public discussion	Podgorica	30

55	10 December	Interagency working group	Podgorica	29
56	15 January 2019	Renewable energy sources and energy efficiency	Podgorica	15
57	15 January 2019	New materials and sustainable technologies	Podgorica	10
58	16 January 2019	Sustainable agriculture and food value chain	Podgorica	10
59	16 January 2019	Sustainable and Health Tourism	Podgorica	6
60	17 January 2019	Information and Communication Technologies	Podgorica	10
61	28 January 2019	Sustainable and Health Tourism	Podgorica	9
62	5 February 2019	“Cooperation for smart specialisation — 1st Western Balkans workshop”	Podgorica	60

Table B — WEB QUESTIONNAIRE – EDP

	LIST OF QUESTIONS
1	What are the comparative advantages and positions of the sector at national, regional and international level?
2	What are the innovative capacities of the enterprise and the potentials for adopting the latest technologies? • What are the new sub-areas with great development potential based on knowledge, competencies and market potential?
3	What are the new products, services or processes that can create new value chains in the sector? • If you could do something, what would you change?
4	What are the specific specialties within the sector that are most successful and are emergent?
5	What are the main challenges in the business operation and development of the enterprises?
6	What are the state measures that can have a positive impact on the sector?
7	What are the sub-areas in the sector that produce a synergistic effect in relation to the other priority sectors that have been identified so far?
8	Please define three problems in your field of work that exist in Montenegro, in relation to which you believe there is a chance that science and innovation could offer adequate solutions. The problems should relate to the lack of knowledge and technical solutions and should be possible to address by scientific and/or expert assistance. • Are there available resources for dealing with the above problems, which could contribute to their successful resolution (natural and human resources, previous research in Montenegro, interest of foreign donors / investors, etc.)? 1. Yes (Please specify _____) 2. No (Please specify _____)
9	What are the current trends in the sector that can negatively influence its future?
10	How much has the sector changed in the last five years? • Great negative changes • Small negative changes • No changes • Small positive changes • Great positive changes
11	What are the development trends in your sector for the next five to ten years?
12	What are the products, services or processes from your sector that make an important difference in the world market? • How could we reach that level? _____
13	Are you going to continue doing business in your sector and why?
14	Are you willing to invest your own funds in innovation and research projects in order to improve your business operation? 1. Yes (Please specify the reasons _____) 2. No (Please specify the reasons _____)
15	What has helped you to get where are you now and what else should you do to move even further in the desired direction? • If you could do something, what would you change?

IX ANNEX 3

FLAGSHIP INITIATIVES

Flagship initiatives are programmes that have been identified through EDP for each of the S3.me priority domains. The EDP has identified numerous already-existing research and innovation projects, along with creative ideas or concrete project proposals that are complementary to realistic needs and opportunities the business community would like to seize by relying on state assistance. These innovative projects and proposals have been carefully grouped and refined in order to distinguish flagship initiatives as programmes that promote the most promising project groups from the economic point of view. Therefore, each flagship initiative will contain a number of projects related to the specific priority domain in which the country has significant innovation potential and the chance to establish competitive advantage on the international market or to upgrade domestic social environment.

Projects within each flagship initiative are connected by a common subject matter containing both the research and innovation capability and the commercialisation potential. Gathering flagship initiative projects around the common subject matter will enable development of excellence in a particular innovation niche, providing for engagement of much broader innovation and business capacities, which would not be possible if flagship initiatives related only to a single project. Such an approach considerably increases success odds in a country with generally limited resources, guaranteeing broader involvement of stakeholders, particularly SMEs, in the smart specialisation process.

Table A — Overview of Flagship Initiatives

Priority domains	Flagship Initiatives	Subject matter
Sustainable agriculture and food value chain	Bio mapping and Engineering (BME)	Autochthonous plant, animal and microbial species
Energy and sustainable environment	Renewable energy sources and energy efficiency	Renewable energy sources and energy efficiency
	Circular Economy (CE)	Recycling industrial waste
Sustainable and health tourism	Adriatic Centre for Bone and Muscular System Diseases	Medical treatment and rehabilitation for bone and muscular system diseases
ICT	Digital Transformation	Digital technologies relevant to S3.me priority domains and public administration

Competent authorities within the S3.me governance model will undertake a higher level of commitment to the implementation of flagship initiatives, accordingly narrowing the scope of S3.me implementation. After the adoption of the Strategy, a feasibility study shall be developed for each flagship initiative within the set timeframe. These feasibility studies shall thoroughly elaborate the network of relevant projects, their particular subject within the general subject matter, necessary personnel and equipment for implementation, required involvement of domestic and international partners, ways of commercialisation of innovative products, necessary financial resources and execution timeframes. Moreover, these feasibility studies shall list, evaluate and assess innovation contribution and financial value of the already existing projects in line with the flagship initiatives; such projects have served as a foundation for flagship initiatives identification.

Accordingly, flagship initiatives will not only pave the way for implementation of a network of distinguished research and innovation projects, but will also engage in promotion and provision of market access and positioning of innovative products which is equally important. Likewise, this approach shall enable application of a governance model, managed by the new National Office for S3.me, which presumes close collaboration between the competent bodies in charge of research and innovation policy and competent bodies responsible for policy areas with direct economic and social impact, primarily those closely related to S3.me priority domains. Consequently, limited national financial resources designated for R&I should be augmented by attracting private sector capital. Moreover, this capital shall be predominantly directed at commercialisation of innovative products, enabling future financial streams to be channelled through smart specialisation priority domains that would ultimately lead to systemic transformation of the national economy into a knowledge-based economy.

IX ANNEX 4

ACTION PLAN FOR S3.ME IMPROVEMENT

Table A — Action Plan for S3.me

	Activity	Timeframe
1.	National Office for Smart Specialisation established	3 months following the S3.me adoption at the latest
2.	Feasibility studies for Flagship Initiatives developed	9 months from the National Office for S3.me establishment
3.	Reliable innovation statistical data provided In 2018, the National Statistical Office (MONSTAT) carried out a pilot survey on innovative statistics for methodology testing purposes. In 2019, in cooperation with the Ministry of Science, a new pilot survey will be undertaken for testing the changed methodology. Data from pilot surveys are not available for publication due to the requirements of Article 33 of the Law on Official Statistics and the Official Statistical System of Montenegro ("Official Gazette of Montenegro", no. 18/12). Hence, official innovation statistics may be expected for the following year.	By the end of 2020
4.	European Innovation Scoreboard enrolment	2021 edition
5.	Structural business statistics (SBS) – NACE level 3 The data for the production of structural business statistics (SBS) are collected from administrative and statistical data sources (Tax Administration of Montenegro). Articles 53-60 of the Law on Official Statistics and the Official Statistical System define the framework for the protection, use and transfer of confidential data. This framework restricts publication of data that can enable identification of individual reporting units, which may be the case in Montenegro given its small size and a limited number of companies per sector.	Work with MONSTAT to define the timeframe for collection of SBS – NACE level 3
6.	Multiannual budgetary planning introduced The current public finance system provides only for annual planning of budgetary expenditures. This was favourable for S3 adoption, as it enabled the introduction of new policy approach into the national system. There were no constraints that could be imposed by mid-term limitations of financial sources already distributed through previously adopted policy documents. However, mid-term national budgetary planning, i.e. budgetary planning for three-year periods, has been announced.	Announced for 2021

IX ANNEX 5

LIST OF ABBREVIATIONS

3D	Three-dimensional
5G	Fifth Generation Cellular Network Technology
AMM	Association of Montenegrin Managers
AR	Augmented Reality
B&T	Business and Technology
CALIMS	Montenegrin Agency for Medicines and Medical Devices
CANU	Montenegrin Academy of Sciences and Arts
CBCG	Central Bank of Montenegro
CERN	European Organization for Nuclear Research
CETI	Centre for Ecotoxicological Research
CG KO CIGRE	Montenegrin National Committee for the International Council on Large Electric Systems
CoEs	Centres of Excellence
COTEE	Montenegrin Electrical Energy Market Operator
CTU	Montenegrin Tourism Association
DSL	Digital Subscriber Line
EDP	Entrepreneurial Discovery Process
EEN	Enterprise Europe Network
EES	Electric Energy System
EC	European Commission
ERP	Enterprise resource planning
EU	European Union
EUROSTAT	European Statistical Office
FAIR	Facility for Antiproton and Ion Research
FDI	Foreign Direct Investments
GDP	Gross Domestic Product
GNSS	Global Navigation Satellite System
GSI	Centre for Heavy Ion Research
HTA	Health Technology Assessment
ICT	Information and Communications Technology
IDF	Investment and Development Fund
IJZCG	Public Health Institute of Montenegro
IMF	International Monetary Fund
IoT	Internet of Things
IPC	International Patent Classification
IPR	Itelectual Property Rights
IT	Information Technologies
JP	Public Company

KCCG	Clinical Centre of Montenegro
MBA	Montenegro Business Alliance
MoE	Ministry of Economy
MHE	Small hydro power plants
MICE	Congress Tourism (meetings, incentives, conferences and exhibitions)
MoPA	Ministry of Public Administration
MoS	Ministry of Science
MONSTAT	Statistical Office of Montenegro
MoSDT	Ministry of Sustainable Development and Tourism
MoEdu	Ministry of Education
MoARD	Ministry of Agriculture and Rural Development
MoSp	Ministry of Sports
MoH	Ministry of Health
NACE	The Statistical Classification of Economic Activities in the European Community
NATO	The North Atlantic Treaty Organization
NFV	Network functions virtualization
NICE	System of Classifying Goods and Services for the Purpose of Registering Trademarks
NID	Scientific Research Activity
NTO	National Tourism Organisation
NUTS	Nomenclature of Territorial Units for Statistics
OB	General Hospital
PKCG	Chamber of Economy of Montenegro
PPP	Purchasing Power Parity
RCC	Regional Cooperation Council
RES	Renewable Energy Sources
R&D	Research and Development
R&I	Research and Innovation
S3	Smart Specialisation Strategy
S3.me	Smart Specialisation Strategy of Montenegro
SBS	Structural Business Statistics
SDN	Software-Defined Network
SME	Small and Medium-sized Enterprises
STP	Science and Technology Park
SWOT	Strengths, Weaknesses, Opportunities and Threats
TE	Thermal power plant
TTO	Technology Transfer Office
UCG	University of Montenegro
UDG	University of Donja Gorica
UNESCO	The United Nations Educational, Scientific and Cultural Organization
UNKCG	Association of Oil Companies of Montenegro
UNWTO	World Tourism Organization
UP	Employers Federation
VR	Virtual reality
WB	Western Balkans

IMPRESSUM

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