

Pursuant to Article 38, paragraph 1 of the Law on the Planning System of the Republic of Serbia ("Official Gazette of the Republic of Serbia", No. 30/18) and Article 10 of the Law on Science and Research ("Official Gazette of the Republic of Serbia", No. 49/19), the Government is passing the

STRATEGY

on Scientific and Technological Development of the Republic of Serbia for the period 2021-2025 "The Power of Knowledge"

"Official Gazette of RS", No. 10 dated February 10, 2021.

SUMMARY

The Strategy on Scientific and Technological Development of the Republic of Serbia for the period 2021-2025, with the motto "Power of Knowledge" (hereinafter referred to as the: "Strategy"), represents a strategic instrument for improving the quality of life of citizens of the Republic of Serbia through scientific and technological development. The Strategy is based on the belief that the Republic of Serbia will be strong, prosperous and respectable in proportion to the knowledge of its citizens. In the globally challenging environment, this Strategy recognizes knowledge as a reliable foundation for future economic progress and growth of citizens' standards, education development and preservation of health, security and national identity in the Republic of Serbia.

Developed in an extensive strategic planning process that took place in the period of the COVID-19 pandemic, the Strategy has recognized the frightening and devastating impact of numerous social challenges, but also the hidden strengths of our science research and innovation system, able to respond to these challenges by creating new knowledge. Based on a detailed current status assessment, the Strategy on Scientific and Technological Development of the Republic of Serbia for the period 2021–2025 envisages the development of an environment in which science, research and innovation system stakeholders can make a step forward in terms of the quality and influence. Based on this mechanism, the general goal of the Strategy is to accelerate the development of the Republic of Serbia through the improvement of the quality and efficiency of science, technological development and innovation and further integration into the European Research Area.

Although conservative in recognizing and preserving the existing potential of scientific and technological development, on the one hand, the Strategy has maintained the continuity of strengthening the scientific research and innovation system. Adopted immediately after major changes had happened in the sector, including changes to the legislative framework, finance methodology and the establishment of new institutions, the Strategy has ensured the continuity of these reforms and, with gradual improvements, enabled their sustainable implementation. In particular, the Strategy envisages measures that will provide the necessary conditions for the dynamic development of the scientific research and innovation system through the regulation

of targeted levels of funding, development of human resources and infrastructure. Also, the Strategy envisages measures that will increase the efficiency and coherence of the use of existing resources, but also continue the process of strengthening international cooperation.

Progressive in recognizing weaknesses and in adapting to social challenges, on the other hand, the Strategy uses proved and tested experiences of developed countries and directs the scientific research and innovation system towards the state-of-the-art science through the ongoing increase in competitiveness and quality-based evaluation. The strategy envisages specific measures for improving the quality of basic research and strengthening the competitiveness of the economy through fostering innovation. At the same time, the Strategy provides new mechanisms for responding effectively to social challenges and priority technologies. In particular, the strategy recognizes social challenges in the areas of citizens' health and standard; food and water; security and defense; energy, environmental protection and climate changes; promotion of national identity and strengthening state decision-making. The strategy also recognizes priority technologies in the areas of ICT and artificial intelligence; innovative industries and industry 4.0; as well as emerging technologies of strategic interest.

Within the given national and international strategic framework, the Strategy on Scientific and Technological Development of the Republic of Serbia for the period 2021–2025 envisages a series of measures that will simultaneously strengthen (1) institutions, (2) researchers and (3) research teams in scientific research and innovation system. This implies that scientific and technological development institutions shall become internationally renowned, able to solve problems independently and respond to social challenges. Empowerment of researchers is carried out with the aim of developing leading researchers who are recognized globally, while research teams are expected to be able to participate in competitive projects and create new knowledge, technologies and jobs.

TABLE OF CONTENTS

SUMMARY

INTRODUCTION

PLANNING DOCUMENTS AND LEGAL FRAMEWORK RELEVANT TO THE STRATEGY

National Strategy Framework

International Framework for the Adoption of the Strategy

OVERVIEW AND CURRENT STATUS ASSESSMENT

I Performance Indicators of the Scientific Research and Innovation System

II Institutional Framework

III Funding Structure

IV Human Resources

V Review of the Implemented Measures Defined in the Previous Strategy

VI SWOT Analysis

IMPACT ASSESSMENT

RISK ASSESSMENT

IMPLEMENTATION MONITORING MECHANISMS

CONSULTATIONS WITH STAKEHOLDERS

ACTION PLAN

FINAL PROVISIONS

Action Plan

ANNEXES

Annex 1 – Serbian Science Tradition

Annex 2 – New Institutional Framework

Annex 3 – Funding Structure

Annex 4 – International Cooperation

Annex 5 – Trust of the Citizens of the Republic of Serbia in Scientists

LIST OF ABBREVIATIONS

AP	Action Plan
GDP	Gross Domestic Product
AI	Artificial intelligence
GII	Global innovation index
DAAD	Deutscher Akademischer Austauschdienst
EUROSTAT	European Statistical Office
ESS	European Social Survey
WB EDIF	Western Balkans Enterprise Development and Innovation Fund
ENIF	Enterprise Innovation Fund
EDP	Entrepreneurial Discovery Process
EIT	European Institute of Innovation and Technology
EC	European Commission
EOSC	European Open Science Cloud
ERC	European Research Council
ERA	European Research Area

ERIC	European Research Infrastructure Consortium
ESFRI	European Strategy Forum on Research Infrastructures
EU	European Union
EU28	28 European Union countries
EURECA	European Initiative for Research and Development
R&D	Research and Development
ICT	Information and Communication Technologies
IPA	Instrument for Pre-Accession Assistance
AII	Adriatic Ionian Initiative
COVID-19	Coronavirus disease – 2019
KONUS	Conference of Universities of Serbia
PIMO	Public Investment and Management Office
MAP REA	Multi-Annual Action Plan on Regional Economic Area
ME	Ministry of Economy
MJ	Ministry of Justice
MESTD	Ministry of Education, Science and Technological Development
MSME	Micro, Small and Medium Enterprises-
MF	Ministry of Finance
SRO	Scientific Research Organizations
SRP	Science and Technology Park
OECD	Organization for Economic Cooperation and Development
JINR	Joint Institute for Nuclear Research
JRC	Joint Research Center
FP6	Sixth Framework Program for Research and Technological Development (2002–2006)
FP7	Seventh Framework Program for Research and Technological Development (2007–2013)
CSOs	Civil Society Organizations
CCS	Chamber of Commerce of Serbia
RS	Republic of Serbia
RSD	Serbian Currency, Serbian dinar
RCC	Reginal Cooperation Council
RSO	Republic of Serbia Statistical Office
SANU	Serbian Academy of Sciences and Arts
STEM	Science, Technology, Engineering and Mathematics
SCOPUS	Abstract and Citation Database of Elsevier
TONUS	Team for Open Science in Serbia
TT	Transfer Technology
UNIDO	United Nations Industrial Development Organization
SF	Science Fund of the Republic of Serbia
FTE	Full-time equivalent
Horizon 2020	Horizon 2020 Framework Program for Research and Innovation (2014–2020)
CERN	European Organization for Nuclear Research
CERIC	Central European Research Infrastructure Consortium
CPS	Center for the Promotion of Science
COST	European Co-operation in the Field of Scientific and Technical Research

INTRODUCTION

Science is an important component of the development of the Republic of Serbia, just like of any other country. Technological progress, health, security, education and national identity rest on the power of science to create, expand and apply knowledge, which determines the overall quality of life of citizens. In the 21st century, the need for the state-of-the-art science is even more pronounced, because the further development of the economy and society is increasingly based on knowledge as a key resource, while the number of social challenges that can be solved only with new knowledge is increasing.

At the time of compiling this document, the coronavirus pandemic was spreading around the world, threatening to change civilization permanently. Health, security, economy, logistics, civil liberties have been at stake. The collapse of health systems has led to large numbers of casualties in many countries. Economic losses and social instability have exceeded the negative outcomes of many previous crises. Such rare occurrences with such dramatic consequences are often unpredictable, but they are not isolated or unrepeatable. Different states reacted differently, and the success of their responses depended directly on the existing fund of knowledge and skills.

The Republic of Serbia, like other countries, has faced a number of other social challenges, including climate change, migration, demographic trends and security. Despite the economic recovery, these challenges could slow down the further progress of the Republic of Serbia. Undeniably, science and technology play an important role in preparing responses to such challenges. Crises such as the one caused by the COVID-19 pandemic, when societies are the

weakest, and the necessity of discovering and applying scientific knowledge more pronounced than usual, show the correctness of the belief that the strength of a society is proportional to the knowledge at its disposal. Science should expand the fund of knowledge and technologies that can help us deal with problems that are impossible to predict but will occur in the future.

The Strategy on Scientific and Technological Development of the Republic of Serbia for the period 2021-2025, with the motto "Power of Knowledge" implies that Serbia's strength, prosperity and reputation will be proportional to its knowledge. The strategy identifies steps and defines measures that will strengthen the scientific research and innovation system for the benefit of all citizens of the Republic of Serbia, but also other stakeholders producing, disseminating and applying knowledge in the sectors of education, economy and media.

Progressive in adapting to challenges, but conservative in recognizing existing potentials, the Strategy maintains a continuity of reforms. In that sense, significant successes have been achieved in the previous strategic period. The legal framework has been improved with the enactment of new laws, structural reform has been carried out, the budget has been increased and new institutions have been established. Preconditions have been created for the accelerated development of science in the Republic of Serbia and a greater contribution to the development of the society. In such a framework, this Strategy envisages one general and five specific objectives, as well as a package of measures for their implementation, so as to create an environment in which the quality of institutions, scientific teams and individual researchers will further grow simultaneously.

The strategy is adopted pursuant to Article 38 of the Law on Planning System of the Republic of Serbia ("Official Gazette of RS", No. 30/18) and Article 10 of the Law on Science and Research ("Official Gazette of RS", No. 49/19). The drafting of the Strategy was coordinated by the Ministry of Education, Science and Technological Development, and in its compilation and consultations took part representatives of the working group, Serbian Academy of Sciences and Arts, National Council for Science and Technological Development, Association of Institutes of Serbia, Conference of Universities of Serbia, Science Fund of the Republic of Serbia, Innovation Fund of the Republic of Serbia, Center for the Promotion of Science, Science and Technology Park Belgrade as well as other eminent scientists.

PLANNING DOCUMENTS AND LEGAL FRAMEWORK RELEVANT TO THE STRATEGY

In the social circumstances in which the Strategy was adopted, scientific and technological knowledge is seen as an important, although insufficiently used national resource. Through a number of documents and practices, the Republic of Serbia recognizes the importance of science and research for economic and social growth and job creation. At the same time, the citizens of the Republic of Serbia express great trust in scientists, as shown by public opinion polls (Annex 5)¹.

¹ „Psychological Profile of the Pandemic in Serbia” – PIN – Psychosocial Innovation Network, Laboratory for Experimental Psychological at the Department of Psychology at the University of Belgrade.

The experiences of highly developed countries show that a stable research system is the driving force by which such trust can be justified, and the quality of modern society improved. However, the world around us is changing rapidly, implying the readiness of countries to adapt and continuously learn while strengthening all development capacities. The challenges posed by the COVID-19 pandemic have confirmed this. On the other hand, actions of cooperation, data exchange and development of completely new learning systems, joining forces with the aim of strengthening the capacity of science and research at the national and international level can be the backbone of development.

The strategy is based on a series of sectoral and cross-sectoral strategic documents that provide a legislative framework for the development of science and technology in the Republic of Serbia. This strategy takes into account the determination of the Republic of Serbia to integrate into the European Research Area, as well as to develop in the direction of establishing a knowledge-based economy. With this in mind, the framework for the adoption of the Strategy can be divided into national and international.

National Framework for the Adoption of the Strategy

The legislative framework relevant for the adoption of the Strategy is defined by the Law on Science and Research ("Official Gazette of RS", No. 49/19), the Law on the Science Fund of the Republic of Serbia ("Official Gazette of RS", No. 95/18), the Law on Innovation ("Official Gazette of RS", No. 110/05, 18/10 and 55/13) and the Law on the Planning System of the Republic of Serbia ("Official Gazette of RS", No. 30/18). In addition to the above laws, the national framework for the adoption of the Strategy includes strategic documents such as strategies governing the development of education in the Republic of Serbia, which due to the natural connection of scientific research and innovation system with higher education are inevitably harmonized with this Strategy. The national framework, on the other hand, includes other strategic documents, such as the Smart Specialization Strategy ("Official Gazette of RS", No. 21/20), the Strategy for the Development of Artificial Intelligence ("Official Gazette of RS", No. 96/19), the Industrial Strategy Policies ("Official Gazette of RS", No. 35/20) and the Strategy for the Support to Development of Small and Medium-Sized Enterprises, Entrepreneurship and the Competition ("Official Gazette of RS", No. 35/15).

Article 10 of the Law on Science and Research defines that "in order to plan and achieve long-term strategic objectives, priorities and directions of scientific and technological development, the Government shall adopt the Strategy at the proposal of the ministry responsible for scientific research, in accordance with the law governing the planning system." Article 11 of that law determines the content of the strategy:

- situation in the field of scientific research area;
- objectives to be achieved in the field of science and technological development at the level of the Republic of Serbia;
- priorities and directions of scientific and technological development;
- targeted funds for science and research that are allocated from the budget and the business sector, expressed as a percentage of the gross national income of the Republic of Serbia;
- scientific fields and narrower scientific disciplines, as well as interdisciplinary and multidisciplinary directions that should be particularly developed and financially supported in order to achieve the development objectives of the Republic of Serbia;

- priority needs in science and technological development and priorities for investment in scientific and research programs;
- financial and system preconditions for the Strategy implementation;
- implementation schedule and phases;
- measures aimed at Strategy implementation and Strategy implementation management;
- priorities in terms of coordination of operations of the Science Fund of the Republic of Serbia and the network of institution.

Article 12 of the same law defines that the general interest in scientific research field is pursued through institutional funding programs and other programs of general interest. Institutional funding programs create a legal framework for the funding of accredited institutes and institutes of national importance, the establishment and financing of new institutes founded by the Republic of Serbia, autonomous province, local self-government units and the Serbian Academy of Sciences and Arts. Other programs of general interest for the Republic of Serbia include programs for scientific research, infrastructure, publishing and other forms of support.

Article 3 of the Law on the Science Fund of the Republic of Serbia ("Official Gazette of RS", No. 95/18) specifies that scientific research and development activities are performed through scientific, technological and development programs under which the projects are implemented, in order to achieve objectives defined in the Strategy on Scientific and Technological Development of the Republic of Serbia. The law defines that project funding shall be implemented in such a way as to ensure competitiveness and quality of results, efficiency in application of research, openness and availability of program and project results, as well as the development of scientific personnel, integration into international scientific and technological projects and systems, cooperation with scientific diaspora, business sector and regulation of the property rights on research results, protection of intellectual property and copyright, as well as data protection.

The Law on Innovation Activity ("Official Gazette of RS", No. 110/05, 18/10 and 55/13) regulates the basic principles, objectives and organization of the application of scientific knowledge, technical and technological knowledge, inventiveness and inventions for the purpose of creation and realization new and improved products, processes and services, as enablers of development of the Republic of Serbia.

The Law on the Planning System of the Republic of Serbia ("Official Gazette of RS", No. 30/18) regulates the planning system of the Republic of Serbia, i.e. management of the public policy system and medium-term planning, the types and content of planning documents proposed, adopted and implemented in accordance with their competencies by all participants in the planning system, mutual consistency of the planning documents, the procedure for determining and implementing public policies and the reporting requirements on the implementation of the planning documents, as well as application by analogy of the requirement of conducting regulatory impact assessment and measuring regulatory performance. Article 13 of the Law on Planning System defines that the strategy, as a rule, has one general objective and up to five specific objectives that contribute to the achievement of that general objective, whereas special care shall be taken to ensure that objectives are clearly defined, measurable, acceptable, realistic and time-bound. The same article defines the mandatory content of the Strategy, that shall include the following elements: vision, overview and analysis of the current state, general and specific objectives, measures to achieve general

and specific objectives, key performance indicators at the level of objectives and measures, the institutional framework for the Strategy implementation monitoring and evaluation of Strategy performance.

Smart Specialization Strategy of the Republic of Serbia for the Period 2020 to 2027

The Smart Specialization Strategy in the Republic of Serbia for the period from 2020 to 2027 ("Official Gazette of RS", No. 21/20) defines objectives in such a way to direct, through the process of smart specialization, the development of the Republic of Serbia to become recognized as a country of smart and creative people, highly competitive in the world with its products and services as a result of its knowledge-based innovations, creativity, as well as domestic ecosystem partnerships in the areas of:

- Sustainable high-technology production of high value-added food for the future;
- Sophisticated software solutions for global market;
- Production processes and machines for the future;
- Creative solutions;
- High-level inter-sectoral integrated industrial innovations and business solutions and innovations.

The Strategy for the Development of Artificial Intelligence in the Republic of Serbia for the period 2020-2025

The Strategy for the Development of Artificial Intelligence in the Republic of Serbia for the period 2020-2025 ("Official Gazette of RS", No. 96/19) was adopted in December 2019. The general objective of the strategy is the use of artificial intelligence in favor of economic growth, employment and improvement of the quality of life. Specific objectives of the strategy are:

- Development of education geared to the needs of modern society and economy conditioned by the advancement of artificial intelligence;
- Development of science and innovation in the field of artificial intelligence and its implementation;
- Development of the economy based on artificial intelligence (where this is a key competence and where it is used in different industrial branches);
- Improvement of assumptions for the development of artificial intelligence and public sector services through the implementation of artificial intelligence;
- Ethical and safe application of artificial intelligence.

This Strategy provides definitions of the direction of development and the objectives to be implemented in favor of improvement in this field, as well as establishing clear, measurable and concrete measures contributing to the development of artificial intelligence for all sectors in Serbia.

The specific objective "Development of science and innovation in the field of artificial intelligence and its implementation" states that the artificial intelligence is in the development phase where industry practice often meets problems, the solutions of which require the scientific research approach. As a result of this, an important part of research has moved to the industry. However, the industry also has an increasing need for universities and institutes, as the leaders of the of scientific research personnel. Prerequisites for the successful transfer of research to industry are the strong high-tech industry open to innovation, as well as quality

communication of research sectors of companies operating in the Republic of Serbia with scientific research organizations.

Intellectual Property Development Strategy for the period 2018-2022

The Intellectual Property Development Strategy for the period 2018-2022 ("Official Gazette of RS", No. 78/18) sets the following objectives:

- Harmonization of national and European legislation in the field of intellectual property;
- Improving the implementation of intellectual property rights;
- Education and capacity building for knowledge transfer aimed at improving the application of intellectual property in the economy.

The Republic of Serbia is building an economy based on science and innovation and stronger investments in scientific research and development. By intensifying connection between science and economy, young scientists are enabled to stay in the country, and the country to maintain sustainable growth. Intellectual property rights serve so that everyone can protect its ideas and still share it with the world. This strategy is a starting point for understanding the current situation and strengthening the capacity for knowledge transfer.

Industrial Policy Strategy of the Republic of Serbia from 2021 to 2030

The Industrial Policy Strategy of the Republic of Serbia from 2021 to 2030 ("Official Gazette of RS", No. 35/20) was adopted in March 2020. This public policy document stipulates comprehensive reform steps in the field of industrial development and covers much of the economic activity, with particular emphasis on manufacturing.

The Industrial Policy Strategy of the Republic of Serbia from 2021 to 2030 identifies as one of the strategic challenges of the new industrial policy the growing pressure towards the development of scientific research and development excellence to create and commercialize competitive innovative products and services that properly target the whole world as its relevant market.

In response to the defined challenge, strategic specific objective 2 refers to the development of industry based on innovation and development of higher stages of technological production, especially through measure 2.1 - Incentives for industrial entities to develop innovative solutions through cooperation projects with the scientific research community and measure 2.3 - Support for the development and improvement of production processes through industrial institutional infrastructure projects aimed at supporting institutional infrastructure projects, including science and technology parks.

The Strategy for the Support to Development of Small and Medium-Sized Enterprises, Entrepreneurship and the Competition for the Period from 2015 to 2020

The Strategy for the Support to Development of Small and Medium-Sized Enterprises, Entrepreneurship and the Competition for the Period from 2015 to 2020 ("Official Gazette of RS", No. 35/15) refers to the improvement of conditions for development and competitiveness of micro, small and medium-sized companies and entrepreneurs. The Strategy continues the policy of full respect and the application of all documents that define the policy of the European Union in the area of entrepreneurship and competitiveness. The strategic goal 4 "Enhancing the sustainability and competitiveness of SMEs" deals with the problem of the level of

innovation of companies in the Republic of Serbia (limited scope of technological innovations), as well as insufficiently developed cooperation between science and economy. The Strategy also states that highly innovative companies, such as newly established high-tech companies in the field of information and communication technology and creative industries, are insufficiently supported.

In accordance with the above, in the coming period it is particularly important to build and strengthen the capacity of the national innovation system as a whole, which will effectively connect science and economy and provide support to highly innovative SMEs, enable greater use of EU funds available for these purposes and encourage companies to think innovatively.

International Framework for the Adoption of the Strategy

The strategy relies on the framework of international documents aimed at encouraging the quality of scientific and technological research, innovation, education and the development of the knowledge economy. The general action plan is also based on the values of global security, environmental protection and cultural heritage, respect for human rights and the creation of a sustainable modern society.

The United Nations has set 17 sustainable development goals², as a universal call for action to eradicate poverty, protect the environment, ensure peace and prosperity for all, and foster innovation. The global goals of sustainable development represent clear guidelines, which is why it is important to integrate them into national development plans. The Europe 2030 Agenda for Sustainable Development³, perceives achievement of these goals as the pivotal issue in international cooperation. The Republic of Serbia is one of the five and the only European country that, based on the quality of the process of adopting the Smart Specialization Strategy (4S), was invited in 2019 to join the United Nations Global Program for the Road Map Development in terms of Science, Research and Innovation aimed at achieving Sustainable Development Goals, where it works closely with United Nations agencies (UNIDO) and the European Commission (EC Joint Research Center) to develop this roadmap.

The main goal of the European Union's policy in the field of science and research is to strengthen the scientific and technological system as one of the key factors of sustainable economic development, thus providing a quality framework for conducting scientific research and development of innovations. The Republic of Serbia, as a candidate country for membership in the European Union, follows the *acquis communautaire* and implements the necessary reforms and activities in this area in order to join the European Research Area (ERA). The first negotiation chapter that the Republic of Serbia opened and temporarily closed on its way to the EU is Chapter 25 (Science and Research), which took place at the intergovernmental conference held on December 13, 2016 and indicates the orderliness and level of development of scientific research and innovation system.

² Sustainable development goals: <https://sustainabledevelopment.un.org/sdgs>

³ Towards a Sustainable Europe by 2030: https://ec.europa.eu/commission/sites/beta-political/files/rp_sustainable_europe_30-01_en_web.pdf.

Until 2020, the Europe 2020 Strategy⁴ was in force, which recognizes the European Union as the world's most dynamic economy, based on smart, sustainable and inclusive principles. This document of the European Commission was created with the aim of developing an economy based on knowledge and innovation, at the same time encouraging competitiveness and production that is more efficient in relation to resources and achieving better participation in the labor market in terms of social cohesion.

Horizon 2020 is an instrument for achieving the main goals of the Europe 2020 Strategy, with the aim of ensuring the creation of the state-of-the-art European science and enabling easier cooperation between the private and public sectors in the field of innovative work. In the programming period from 2014 to 2020, this program had a budget of 80 billion euros, and for the next budget period covering the period from 2021 to 2027, the most ambitious research and innovation program of the European Union, Horizon Europe⁵, will be implemented. Namely, the European Commission has proposed a budget of around 100 billion euros⁶, for research and innovation. Building on the successes and achievements of the previous programming cycle, Horizon Europe aims to achieve scientific excellence, address global challenges and industrial modernization, with concerted research efforts and innovation, based on the principles of open science and partnership.

The precondition for achieving prosperity and development is the coherence of public policies, which is why this program, Horizon Europe, also relies on 17 sustainable development goals. The Republic of Serbia also strives for these goals, among which are the strengthening of scientific and technological infrastructure, encouraging the potential for innovation, competitiveness and career development, strengthening partnerships and exchanges while contributing to the European Research Area.

At the same time, the strategy represents the national Roadmap of the Republic of Serbia for integration into the European Research Area. This means that it includes all six priority areas for the European Research Area:

1. More effective national research systems;
2. An integrated approach to addressing major societal challenges, concentrating resources, joint programming, preventing fragmented research and duplication of effort as well as optimal funding and use of capital, large research infrastructure, in line with the European Strategy Forum for Research Infrastructures (ESFRI) and the national roadmap;
3. Visibility, openness, transparency of open competitions announced for research positions in the system, open and based on excellence European Research Area, open labor market for researchers;
4. Gender equality in management positions, development of gender equality policy in research organizations;
5. Optimal circulation, access and transfer of scientific knowledge, including knowledge exchange and open access to science;

⁴ <https://www.rcc.int/files/user/docs/reports/SEE2020-Strategy.pdf>.

⁵ https://ec.europa.eu/info/sites/info/files/research_and_innovation/strategy_on_research_and_innovation/presentations/horizon_europe_en_investing_to_shape_our_future.pdf.

⁶ https://ec.europa.eu/commission/sites/beta-political/files/budget-may2018-research-innovation_en.pdf&doctype=req&actid=431673

6. International cooperation. The establishment of the Common European Research Area has improved the capacity to form research networks and enabled cooperation and coordination between European and national policies.

The Republic of Serbia is active in the European Strategic Forum for Research Infrastructures (ESFRI). The forum is a strategic instrument for developing Europe's scientific integration and strengthening its international outreach. The guidelines of the European Strategic Forum for Research Infrastructures are of great importance for the development of the Strategy, since the focus is on open access to high-quality research infrastructures, development of scientific research staff and scientific excellence and relevance of the initial assumption. Moreover, the Republic of Serbia is active in four consortia of the European Research Infrastructure (ERIC)⁷, and a founding country of one of them (CERIC ERIC). European research infrastructure consortia represent a specific legal form that facilitates the establishment and operation of Research Infrastructures with European interest. In this way, the Republic of Serbia provides access to large research infrastructures, mobility and exchange of researchers.

Scientific research organizations of our country are encouraged to use scientific research infrastructure and achieve cooperation and participation in the implementation of international programs and projects as well as projects with the business sector.

The open approach to science and the development of a scientific data management plan contribute to improving the quality of research, accelerate the progress of science and have a positive impact on economic growth and innovation. The availability of data is a precondition for easier and faster achievement of sustainable development goals, and a special role in this process is played by the improvement of the artificial intelligence system. In accordance with the recommendations of the European Commission⁸ and the Berlin Declaration, our country has developed an Open Science Platform with the aim of providing access to scientific information, as well as its transparency and accessibility; it is an important document that promotes the principles of open access to scientific data. Also, researchers from our country have the opportunity to participate in the work of the Joint Research Center - a service of the European Commission with a mission to provide scientific and technical support to the drafting, development, implementation and control of European Union policies.

Thanks to the fact that it was one of the 12 founding states of the European Organization for Nuclear Research (CERN) in 1952, the Republic of Serbia has been a full-fledged member since 2019. CERN is the largest international laboratory for fundamental research in physics and related fields. Membership in CERN provides researchers from the Republic of Serbia with access to state-of-the-art laboratories and equipment, and the economy with advanced technology and new jobs.

The Republic of Serbia also sees the potential for achieving the goals of the Strategy within the framework of the European Cooperation in Scientific and Technology (COST) and the

⁷ CERIC (Central European Research Infrastructure Consortium); ERIC, DARIAH (Digital Research Infrastructure for Arts and Humanities) ERIC, ESS (European Social Survey) ERIC and CESSDA (Consortium of European Social Science Data Archives) ERIC.

⁸ Guidelines to the Rules on Open Access to Scientific Publications and Open Access to Research Data in Horizon 2020, https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-pilot-guide_en.pdf.

EUREKA Research and Development Network⁹. COST¹⁰ aims to promote and spread excellence, encourage interdisciplinary scientific research and empower and retain young researchers and innovators. The goals of the EUREKA program are to boost the productivity and competitiveness of European industry and the world market economy, cooperation of industry, small and medium enterprises, innovation organizations, institutes and universities within and beyond national borders, as well as the development of market-oriented European technologies, services and products.

In order to address the challenges faced by countries located in the same geographical area, the European Council has approved macro-regional strategies¹¹, aimed at achieving economic, social and territorial cohesion. The Republic of Serbia is currently actively participating in the implementation of two strategies: the EU Strategy for the Danube Region and the EU Strategy for the Adriatic-Ionian Region.

The European Union Strategy for the Danube Region¹² provides a good framework for regional cooperation, supporting research and strengthening sources of funding for scientific activities, promoting investment in human capital while minimizing brain drain, encouraging innovation and developing priority areas of smart specialization. The Republic of Serbia coordinates priority area 7 - Development of the Knowledge Society (research, education and information and communication technologies) and develops cooperation programs at the multilateral level.

The general objective of the EU Strategy for the Adriatic-Ionian Region¹³ is to promote economic and social prosperity and growth in the region by improving its attractiveness, competitiveness and connectivity. Together with the Republic of Italy, our country is currently coordinating one of the thematic priorities "Connecting the Region", aimed at improving connectivity in terms of transport and energy. Also, our country is involved in the implementation of the Western Balkans Regional R&D Strategy for Innovation.¹⁴

The World Bank New Growth Agenda for Serbia¹⁵ directs policies towards achieving a European level of prosperity through improving the quality of education, increasing productivity, increasing investment, providing incentives for startups with innovative ideas and increasing investment in new technologies.

Our country is also the first country in Southeast Europe to sign a Memorandum of Understanding with the People's Republic of China on participation in the global project "The Belt and Road Initiative". This ambitious initiative¹⁶ aims to foster international cooperation, build leadership capacity, systematically support private sector development, empower human

⁹ <https://www.eurekanetwork.org/data-interactive>

¹⁰ COST Strategic Plan 2017, https://www.cost.eu/wp-content/uploads/2019/08/COST_StrategicPlan.pdf.

¹¹ EU Strategy for the Baltic Sea Region (2009), EU Strategy for the Danube Region (2010), EU Strategy for the Adriatic-Ionian Region (2014) and EU Strategy for the Alpine Region (2015);

¹² European Union Strategy for Danube Region (2010), https://danube-region.eu/download/communication_from_the_commission_2010/?wpdmdl=625&refresh=5d5fe189964b61566564745.

¹³ European Commission, *A Maritime Strategy for the Adriatic and Ionian Seas* (2012).

¹⁴ Source: <https://openknowledge.worldbank.org/handle/10986/16626>

¹⁵ The World Bank: *Serbia's New Growth Agenda*, <http://pubdocs.worldbank.org/en/782101580729358303/Serbia-CEM-Synthesis-web.pdf>.

¹⁶ *The Belt and Road Initiative: A new means to transformative global governance towards sustainable development. United Nations Development Program. China Center for International Economic Exchanges.*

resources by promoting the values of lifelong learning, encourage sustainable policy-making and achieve member states' prosperity and economic synergy in general.

In addition to international regulations and the results of individual programs in which the Republic of Serbia participates, this Strategy takes into account the experiences of countries of similar size and tradition (e.g. Portugal, Slovenia), as well as the experiences of the most developed countries that had periods of rapid growth.

OVERVIEW AND CURRENT STATUS ASSESSMENT

Today, the scientific research and innovation system in the Republic of Serbia represents a dynamic sector, closely connected with education, economy and society, with numerous comparative advantages, hidden strengths, but also various challenges.

During the validity of the Strategy on Scientific and Technological Development of the Republic of Serbia, which was adopted for the period from 2016 to 2020 ("Official Gazette of RS", No. 25/16), some of the key goals were achieved by creating a new legal framework, which has significantly changed the state of scientific research and innovation system:

- The Law on Science and Research ("Official Gazette of RS", No. 49/19)¹⁷ provides institutional funding for institutes, strengthening institutes of national importance, a mechanism for establishing new institutions, more efficient monitoring and evaluation of the institutes, more efficient work of bodies and commissions (more efficient procedure for election to scientific titles); better efficiency of allocation and use of all scientific research and development resources; building and further developing an innovative knowledge-based economy;
- The Law on the Science Fund of the Republic of Serbia ("Official Gazette of RS", No. 95/18)¹⁸ was adopted and one of the strategic goals in the field of science and research: promoting excellence and relevance of scientific research in the Republic of Serbia was realized through project funding.

The circumstances and further development of the field of science and technological development are significantly influenced by the following planning documents:

- Smart Specialization Strategy Serbia for the Period 2020-2027 ("Official Gazette of RS", No. 21/20);¹⁹
- Strategy for the Development of Artificial Intelligence in the Republic of Serbia for the period 2020-2025 ("Official Gazette of RS", No. 96/19)²⁰ as well as the Action Plan for the period 2020-2022 for the implementation of the Strategy for the Development of Artificial Intelligence in the RS;²¹
- Intellectual Property Development Strategy for the period 2018-2022 ("Official Gazette of RS", No. 78/18);

¹⁷ Source: <http://www.mpn.gov.rs/wp-content/uploads/2019/07/Zakon-o-nauci.pdf>

¹⁸ Source: <https://www.paragraf.rs/propisi/zakon-o-fondu-za-nauku-republike-srbije.html>

¹⁹ Source: http://www.mpn.gov.rs/wp-content/uploads/2020/03/strategija_pametne_specijalizacije.pdf

²⁰ Source: <https://www.srbija.gov.rs/tekst/437277>

²¹ Source: <http://www.mpn.gov.rs/wp-content/uploads/2020/06/akcioni-plan.pdf>

- Industrial Policy Strategy of the Republic of Serbia from 2021 to 2030 ("Official Gazette of RS", No. 35/20);²²
- Strategy for the Support to Development of Small and Medium-Sized Enterprises, Entrepreneurship and the Competition ("Official Gazette of RS", No. 35/15).

In order to carry out activities and efficiently implement the principles of open science²³, the Research Infrastructure Roadmap and the Serbia Open Science Platform²⁴ have been in force since 2018, and at the beginning of 2020 the Team for Open Science in Serbia (TONuS) was formed.

According to the records kept by the Ministry of Education, Science and Technological Development, there are 123 universities and faculties, 65 institutes, 6 of which are institutes of national importance accredited for scientific research in the Republic of Serbia. The scientific and technological system also consists of 8 institutes within SANU.

I Performance Indicators of the Scientific Research and Innovation System

The significant tradition of the Republic of Serbia is based on the pioneering achievements of prominent individuals who marked the world history of knowledge, and who came from our region. Scientific discoveries and innovations of Nikola Tesla, Mihajlo Pupin, Milutin Milanković and many other prominent scientists have been incorporated into the world civilization (Annex 1). Their work has inspired the citizens of the Republic of Serbia and represents an indicator of success on which the modern scientific research and innovation sector relies. A detailed insight into the state of science and technological development in the Republic of Serbia today can be assessed through precisely expressed quantitative and qualitative criteria.

Science Performance Indicators

In order to measure the overall development of science in the Republic of Serbia against the rest of the world during the previous decade, two key parameters indicating the quantity and quality of scientific production have been monitored: the number of published research papers and the number of citations.

When these parameters are compared with the situation in the world and in the European Union (according to the data of SCOPUS and Eurostat), the course of progress of local science is clearly noticed, both in the last decade and in the preceding decades. During the 20th century, when the Republic of Serbia was part of a larger state, science used to have a continuous progress, faster than the global average. In the years of crisis at the end of the 20th century, there was a significant decline. In the period under sanctions, both the number of published research papers and the number of citations fell significantly below the global average.

At the beginning of the 21st century, recovery occurred since the quantity and quality of scientific results have been boosting constantly. Consequently, the global average of the number of papers per million inhabitants was reached in 2005; when it comes to the number of citations, Serbia reached the global average in 2011. With the further development of science

²² Source: <https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/vlada/strategija/2020/35/1/reg>

²³ Source: <https://www.eosc-portal.eu/serbia>

²⁴ Source: <http://www.mpn.gov.rs/wp-content/uploads/2018/07/Platforma-za-otvorenu-nauku.pdf>

in the Republic of Serbia, in 2019 the number of research papers and citations per million inhabitants tripled and doubled the world average, respectively.

At the same time, the lag behind the European average (which is approximately five times higher than the world average) is still noticeable. The cause is a smaller number of researchers (per capita) and lower investments, both in relation to GDP and in absolute terms. Figures 1 and 2 show the norm-setting number of scientific papers and citations per million inhabitants, while data on funding and the number of researchers are given below.

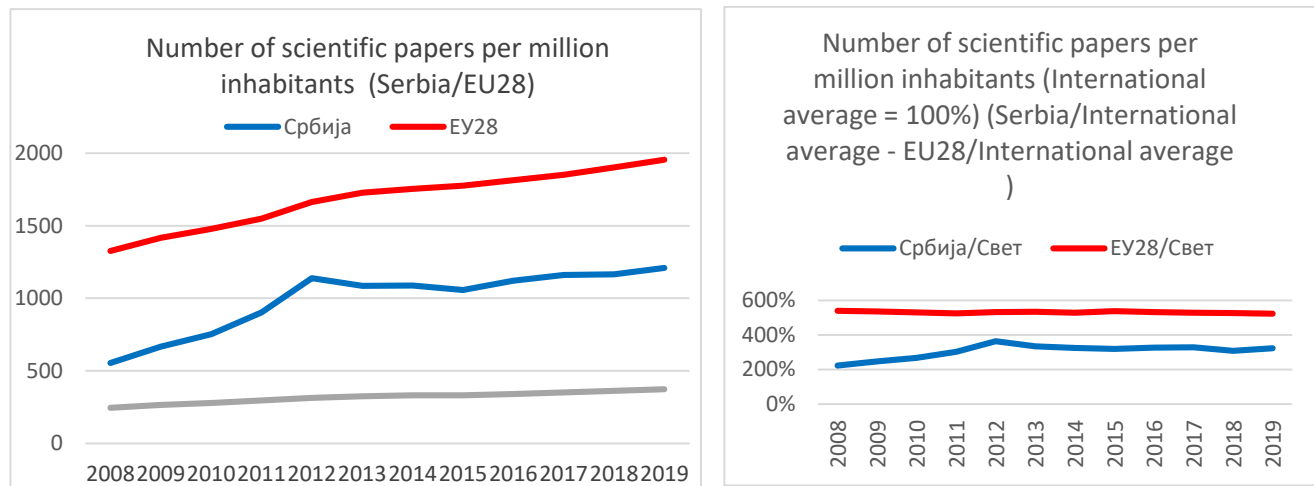


Figure no. 1: Number of scientific papers per million inhabitants in the period 2008–2019. (a. Serbia, European Union and the international average, in absolute values; b. Serbia, European Union against the International average). Source: SCOPUS and Eurostat.

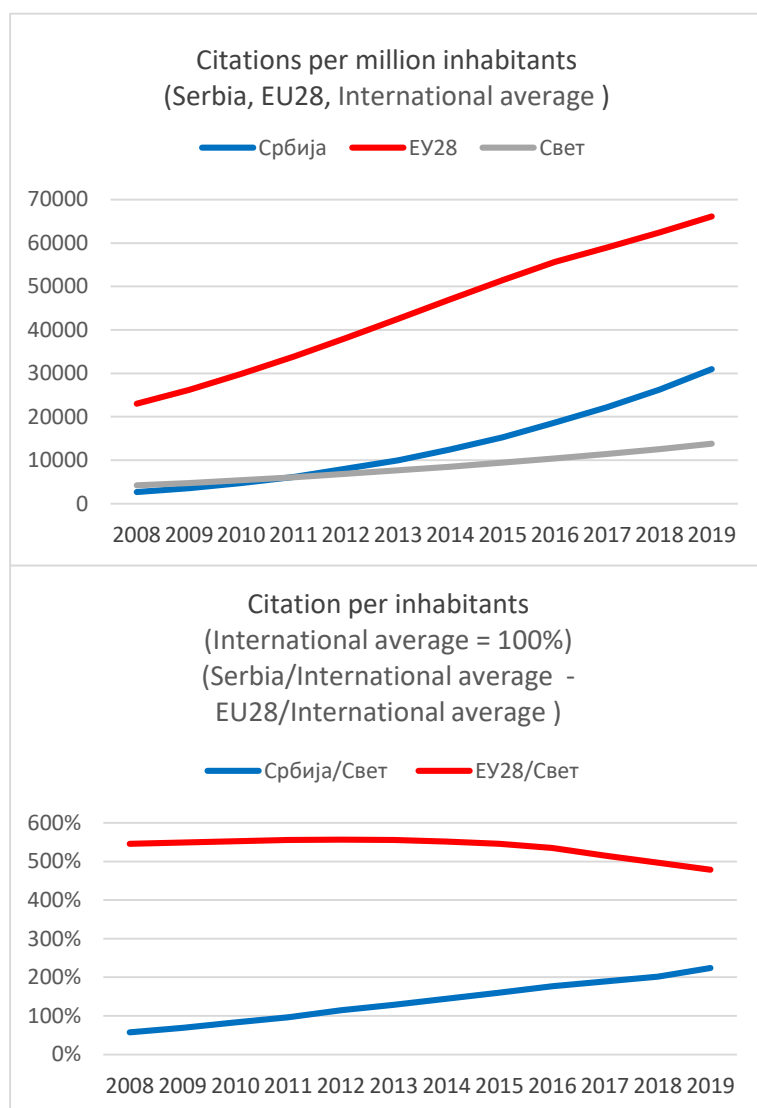


Figure no. 2: Number of cited papers per million inhabitants in the period 2008-2019 (a. Serbia, European Union and international average, in absolute values; b. Serbia, European Union against the international values). Source: SCOPUS and Eurostat.

Technological Development Performance Indicators

The state of technological development in the Republic of Serbia can be perceived through the financial results of the actors in the innovation system. In this context, the example of the results of the IT sector is emblematic, which indicates the evident strengthening of high-tech companies in the Republic of Serbia. According to the data of the National Bank of Serbia²⁵, the Republic of Serbia achieved an exceptional increase in exports of IT services and products from 127 million euros in 2010 to 1,422 million euros in 2019. The realized surplus in the exchange of ICT services of approximately 802 million euros in 2019 represented about 80% of the surplus of total exports of services of the Republic of Serbia.

²⁵ The plan for 2020 with the report for 2019 on realization of priority objectives and activities of the state administration and the Government services aimed at promoting the IT sector in Serbia.

Furthermore, the analysis of data produced by the Innovation Fund confirms the above achievements. Namely, the companies financed under the Mini Grants Program showed a significant increase in revenues from the first year of financing to the fourth year after the completion of the project. The total revenues in the observed companies increased from 3.46 to 8.73 million euros, while the average annual revenues per company increased from 60,500 to 264,500 euros. The companies also record a fairly high "survival rate", where as many as 39% of supported young companies record annual revenues of more than 50,000 euros. A similar trend is shown by companies financed under the Matching Grants Program, where revenues doubled, from an average of 0.6 to 1.17 million euros in annual revenues, three years after the end of the project.²⁶

However, in order to strategically analyze the innovation system and improve the current state of affairs, it is not enough to measure only the financial aspect. It is necessary to compare different indicators of the situation in the Republic of Serbia with other countries, which can be measured in two ways. One is the so-called Global Innovation Index. This index was created by Cornell University, the European INSEAD Institute and the World Intellectual Property Organization in cooperation with other organizations, in order to rank the performance of 129 countries around the world. The index includes 84 indicators (including level of development and application of science, higher education, number of graduated scientific and engineering specialists in the field of high technology, level of development, application and efficiency of technologies and knowledge economy, state of institutions, political stability, rule of law, state of infrastructure, sustainability environment, and others) and is calculated as the average of the results of two groups of indicators of innovative ability and innovative results.

On the list of 131 countries in the world, measured by the Global Innovation Index, the Republic of Serbia ranked the 53rd in 2020.²⁷

Another way to compare the results of the innovation system in the Republic of Serbia and other countries is the Summary Innovation Index, which is published in the European Commission's report and expresses performance in relation to the average of EU member states. The index is based on the analysis of 27 separate indicators, classified into four performance groups such as framework conditions, innovation activities, investments and impacts. The quality of the innovation system of countries is based on a comparative analysis of innovative performance in EU member states, other European countries and neighbors in the region, through an assessment of the relative strengths and weaknesses of national innovation systems.²⁸

According to the Summary Innovation Index, the Republic of Serbia is a moderate innovator measured against the European Union, but it is also a country with rapid growth and development of the innovation ecosystem. Namely, the quality index increased by 24.4% of its value, in the period from 2012 to 2019, but remained relatively low compared to developed European countries. This index places the Republic of Serbia in the middle of the lower right quadrant in Figure no. 3.

²⁶ Source: Data obtained from the Innovation Fund.

²⁷ Global Innovation Index: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2020.pdf

²⁸ Source: <https://ec.europa.eu/docsroom/documents/41898>

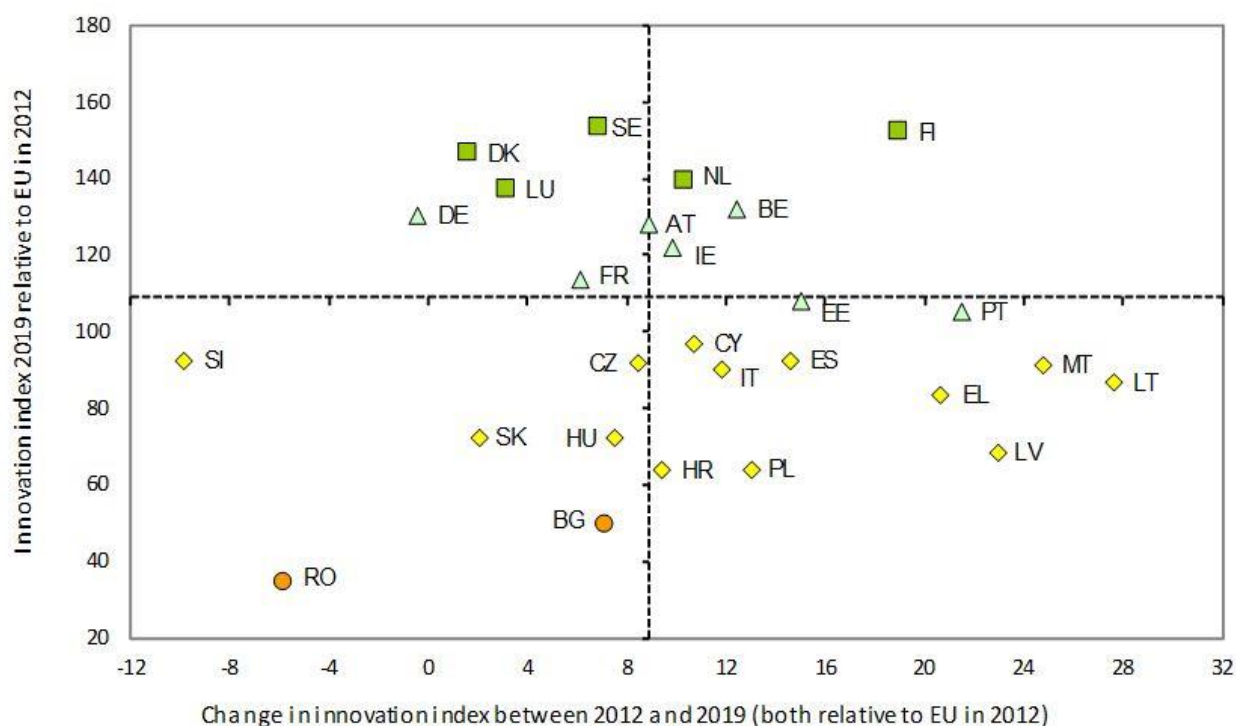


Figure no. 3: Innovation in EU countries and in the Republic of Serbia (ratio of relative innovation index to growth in the period from 2012 to 2019). Source: European Innovation Scoreboard

Significant structural differences between the Republic of Serbia and the members of the European Union contribute crucially to the low and fast-growing value of the index. On the one hand, the value of GDP per capita, the share of employees in medium-tech and high-tech companies, as well as the share of employees in the services sector in the base year 2019 are far lower than the European averages. The best performance was achieved in terms of business investments, connections and the impact of innovative activities of business entities on employment, and the weakest in the field of attractiveness of the environment for innovation and intellectual property. But on the other hand, GDP growth as well as the net amount of foreign direct investment exceed the European average. In addition to these factors, the growth of the index is also accomplished thanks to the structural and institutional reforms implemented by the Republic of Serbia, especially in the period from 2016, as well as the activities implemented within scientific-research organizations, especially research and development institutes.

The increase in the number of innovators additionally testifies to the improvement of the state of the innovation system. Thanks to systemic and infrastructural support, a significant increase in the number of innovation organizations has been achieved. According to the data of the Ministry of Education, Science and Technological Development entered in the Register of Innovation Activities, which is defined by the Law on Innovation Activity, the innovation system today includes the entire spectrum of actors. Since its establishment at the beginning of 2006, of the Register has recorded: 69 innovation organizations (7 innovation centers, 18 research and development centers and 44 development and production centers), 11 innovation organizations for infrastructural support of innovation activities (business-technological incubators and science and technology parks) and 95 individual innovators. If we look only at the network of science and technology parks in the Republic of Serbia, and according to the data submitted by individual science and technology parks in 2020, a total of 144 development and startup companies operate, employing 1295 employees.

The state of the innovation system is additionally reflected in a traditional competition through which the vitality of the network of innovators in the Republic of Serbia is demonstrated. Every year, the Ministry of Education, Science and Technological Development finances the competition for the best technological innovation in the Republic of Serbia. The competition is presented through the media, and it is organized by the Faculty of Technical Sciences in Novi Sad and the Faculty of Technology and Metallurgy in Belgrade in cooperation with the Serbian Chamber of Commerce and the Serbia Public Broadcaster.

International Cooperation Performance Indicators

The Republic of Serbia has been achieving crucial results in international cooperation through participation in multilateral, regional and bilateral programs. The success in international cooperation has been achieved, *inter alia*, thanks to the excellent international connection of Serbian researchers. According to the research²⁹, the University of Belgrade is on the high 16th place in the world in terms of connections with international co-authors, with a total of 40,466 co-authors. By comparison, the top-ranked University of Oxford has 54,813 such co-authorships.

The most important multilateral programs are Horizon 2020, COST and EUREKA; moreover, regional programs are realized through the implementation of the EU Strategy for the Danube Region, the Adriatic Ionian Initiative and the Central European Initiative, while bilateral cooperation is conducted with a large number of countries, including strategic partners.

The associate membership of the Republic of Serbia in the Horizon 2020 program has enabled scientific research organizations from the Republic of Serbia to participate in public calls under absolutely equal conditions. According to June 2020 statistical data, as of 2014 Serbian institutions took part 491 times in the Horizon 2020 program. 338 projects were contracted for financing, with a total budget of 109.7 million euros awarded to institutions from the Republic of Serbia. Of that total, in the area of Social Challenges, 170 projects were approved, and 43 million euros awarded, in the area of Industrial Leadership there were 63 projects of the total value of 28 million euros, in the area of Excellence in Science 67 projects for the total amount of 16 million euros, and in horizontal support activities 38 projects were awarded for the total amount of 22.7 million euros.

Table no. 1. gives a comparative overview of the participation of institutions from our country in the Seventh Framework Program (FP7) and the Horizon 2020 program, according to the data of the electronic database of the European Commission on June 18, 2020.

Table no. 1: Comparative analysis of the participation of RS institutions in OP7 and Horizon 2020

Republic of Serbia Data relevant to the executed contracts by June 18, 2020	Horizon 2020	OP7
Total number of RS institutions taking part in projects	491	318
Total number of contracts with at least one participant from RS	338	236
Approved EU budget for participants from RS (mil euro)	109.7	63.6

²⁹ Ribeiro, L. C., Rapini, M. S., Silva, L. A., & Albuquerque, E. M. (2017). Growth patterns of the network of international collaboration in science. *Scientometrics*, 114(1), 159–179. doi:10.1007/s11192-017-2573-x

The participation of scientific research institutions from the Republic of Serbia in Horizon 2020 exceeded the participation in the previous framework program FP730.³⁰

The share of researchers from the Republic of Serbia in the total number of current COST actions is constantly growing and in 2019 it reached 92%. The total transfers of funds for networking activities of our researchers by COST have been increasing over the years, both in absolute terms (exceeding the amount of one million euros since 2018) and in terms of participation percentage.

The Republic of Serbia has been actively participating in the EUREKA program since 2002. To date, the realization of 85 EUREKA projects with Serbian participation has been successfully completed, in which 12 large companies, 72 small and medium enterprises, 18 institutes and 79 faculties participated, with an investment of the private and public sector in the amount of 217.39 million euros. The largest number of projects with Serbian participation was generated in the field of information technologies (31), then in the field of new materials (16) and in the field of medical sciences and biotechnology (14 each).

The implementation of bilateral cooperation projects with Slovenia, France, Portugal, Austria, Germany, China, Italy, Belarus, Croatia, Slovakia, Hungary and Montenegro is currently ongoing. Based on published public calls from 2010 to date, more than 1,300 bilateral projects have been funded, including strategic projects with China.

International cooperation of scientific research organizations from the Republic of Serbia is realized within the framework of international organizations such as CERN and JINR in Dubna, as well as within the consortium of research infrastructures ERIC. Through these collaborations, researchers have achieved a significant number of international publications, gained scientific and professional experience and accessed the best research infrastructure in the world. In addition to science research organizations, Serbian companies have also benefited from this form of cooperation through engagement and financial gain stemming from different jobs and projects organized by the above international organizations.

A detailed overview of the international cooperation program is provided in Annex 4.

II INSTITUTIONAL FRAMEWORK

The Law on Science and Research, the Law on Innovation Activity and other relevant laws define the legal framework and actors of scientific research and innovation activities. The fundamental importance in this system is given to scientific research organizations with a long tradition and recognizable achievements in all scientific branches and disciplines: Serbian Academy of Sciences

³⁰ Scientists from the Republic of Serbia – *Sofija Stefanović from the Faculty of Philosophy of the Belgrade University and BioSens Institute and Magdalena Djordjević, from the Physics Institute won a European Research Council prestigious grants (ERC grants) intended for outstanding science ideas/projects, pushing the frontiers of knowledge. The largest single project from Serbia is ANTARES, aimed at financing the construction of the Centre of Excellence for Advanced Technologies in Sustainable Agriculture, of the BioSens Institute, amounting to 28 million euro, of which 14 million are grant funds, while 14 million is counterpart funding provided by the Government of the Republic of Serbia.*

and Arts (SANU), Matica Srpska, universities, faculties, science institutes, research and development institutes and innovation centers.

With the adoption of new legal framework in the previous strategic period, opportunities were gained to establish new institutions, change and expand the mission of existing institutions and acquire a new status of universities and institutes of national importance for the Republic of Serbia. By the end of the project cycle 2011 - 2019, a consensus was reached in the scientific community to change the strategic commitment from a flexible but fragmented project approach toward the systematic strengthening of institutions in science and technological development. It is expected that the results of these changes will lead to the introduction of a natural structure, strengthening of control mechanisms and rather increased efficiency in the work of institutions. As a precondition for the sustainable realization of the above plans, but also as the measures defined in this strategy, the Law on Science and Research was adopted in the Republic of Serbia in the previous period, the institutional and infrastructural component was built through the Innovation Fund and the Science Fund of Serbia was established. Balanced regional development has been supported by the establishment of new institutes (Institute of Information Technologies in Kragujevac and BioSense in Novi Sad), as well as the establishment of a network of science and technology parks (Nis, Cacak, Novi Sad, Belgrade) with the intention of additional expansion.

The establishment of the Science Fund is envisaged by the Law on the Science Fund of the Republic of Serbia, which was adopted in December 2018. The primary goal of establishing the Science Fund of the Republic of Serbia, as a special organization, is to provide support to scientific research and development activities in the Republic of Serbia, management and provision of funds, as well as provision of professional support to researchers from accredited scientific research organizations aimed at implementing science project within programs organized by the Science Fund of the Republic of Serbia. The Law envisages the following programs of the Science Fund: 1.) Development; 2.) Strategy; 3.) Ideas; 4.) Human Resources; 5.) Infrastructure; 6.) Cooperation; 7.) Innovation; 8.) Promotion; 9.) Publications; 10.) Creativity; as well as other relevant programs. More information on the Science Fund are provided in Annex 2.

The Law on Innovation Activity is a framework document for establishing organizations for providing infrastructural and professional support to innovation activities, i.e., connecting innovation organizations on the one hand and economic entities on the other hand. The Law on Innovation Activity established the Innovation Fund, as a state organization specialized in supporting innovations and managing financial resources to promote innovations, in order to improve the links between science, technology and economy by supporting innovative entrepreneurship at an early stage of development, connecting science research organizations and private companies for the development and commercialization of innovations, through support to new products, technologies and services to enter the market, as well as through long-term state support for innovative entrepreneurship in cooperation with international financial institutions, organizations, donors and the private sector.

The current programs of the Innovation Fund are: Mini Grants Program, Matching Grants Program, Collaborative Grant Scheme Program, Technology Transfer Facility Program, Innovation Vouchers, while the Acceleration Program is currently under preparation. From its establishment until the third quarter of 2020, the Innovation Fund approved through various programs, the total of EUR 25.9 million intended for 192 innovation projects, EUR 3.2 million for 632 innovation vouchers and EUR

540,000 euro for the technology transfer facility programs, as well as EUR 1.7 million for the Proof of Concept. A total of approximately EUR 31 million has been approved.

Both Funds responded quickly and efficiently to the crisis caused by the pandemic by announcing public calls for financing projects under the Special Research Program COVID-19 and the Call for Suppression of the Effects of the COVID-19 Pandemic.

The Center for the Promotion of Science was established with the aim of promoting science and technology, through cooperation with research and educational institutions locally and globally, with the private sector, the media, and government agencies. With the adoption of the Law on Science and Research, the Center for the Promotion of Science has continued with the implementation of initiated projects, and at the same time it is entrusted with the role of coordinator of all scientific and educational centers established by the Government, specialized organizations and associations dealing with additional education and training of talented pupils and students to engage in scientific research.

In the previous period, four SRPs were established, territorially concentrated in Belgrade, Novi Sad, Čačak and Niš, with efforts to further expand the network. A total of 144 companies operate within the SRP network in the Republic of Serbia, of which 74 are start-ups and 70 are high-tech, with a total of 1,295 employees (Figure 4).

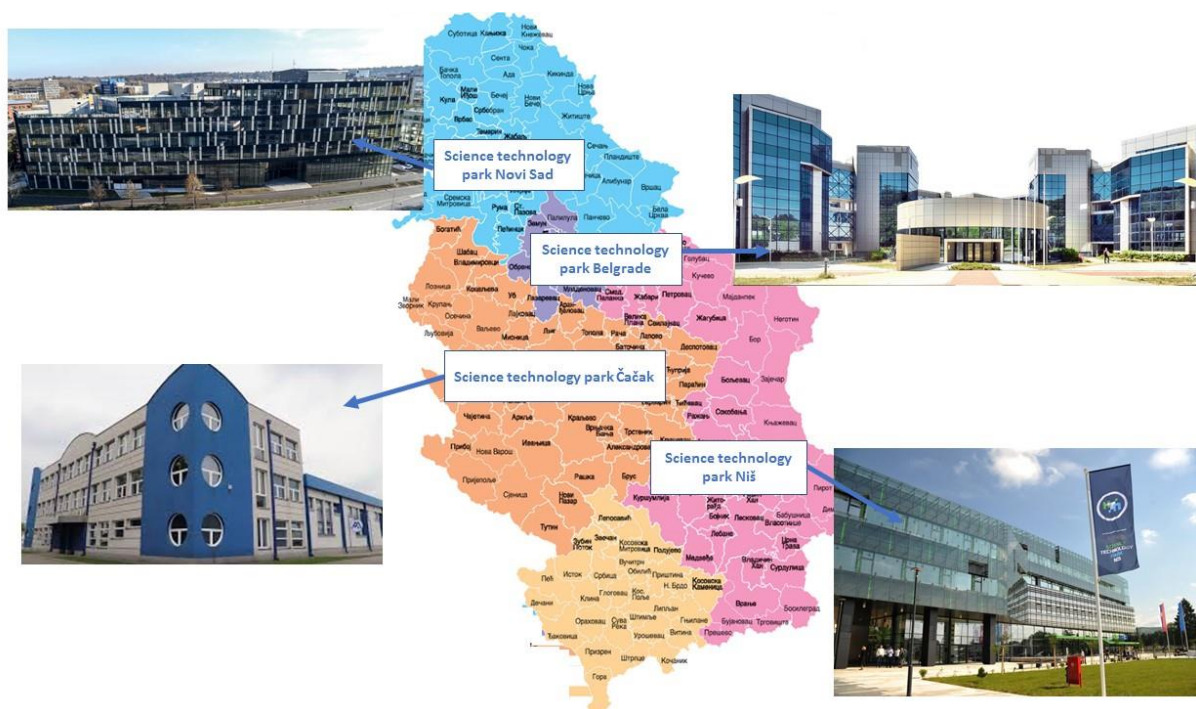


Figure no. 4: Map of the network of science and technology parks and their even distribution by regions of the Republic of Serbia. Source: MESTD.

The institutional component of funding includes institutional funding of the institutes.³¹ The network of institutes consists of institutes in the fields of social sciences, humanities, natural sciences,

³¹ Figure no. 5 shows institutes founded by the Republic of Serbia and in jurisdiction of the Ministry of Education, Science and Technological Development, while Figure no. 6 shows institutes founded by the Serbian Academy of Science and Arts. Beside the above institutions conducting scientific research activities, there are also accredited institutied in the area of defense, health and agriculture.

mathematics, technical technologies, biotechnology, as well as institutes dealing with multidisciplinary research.

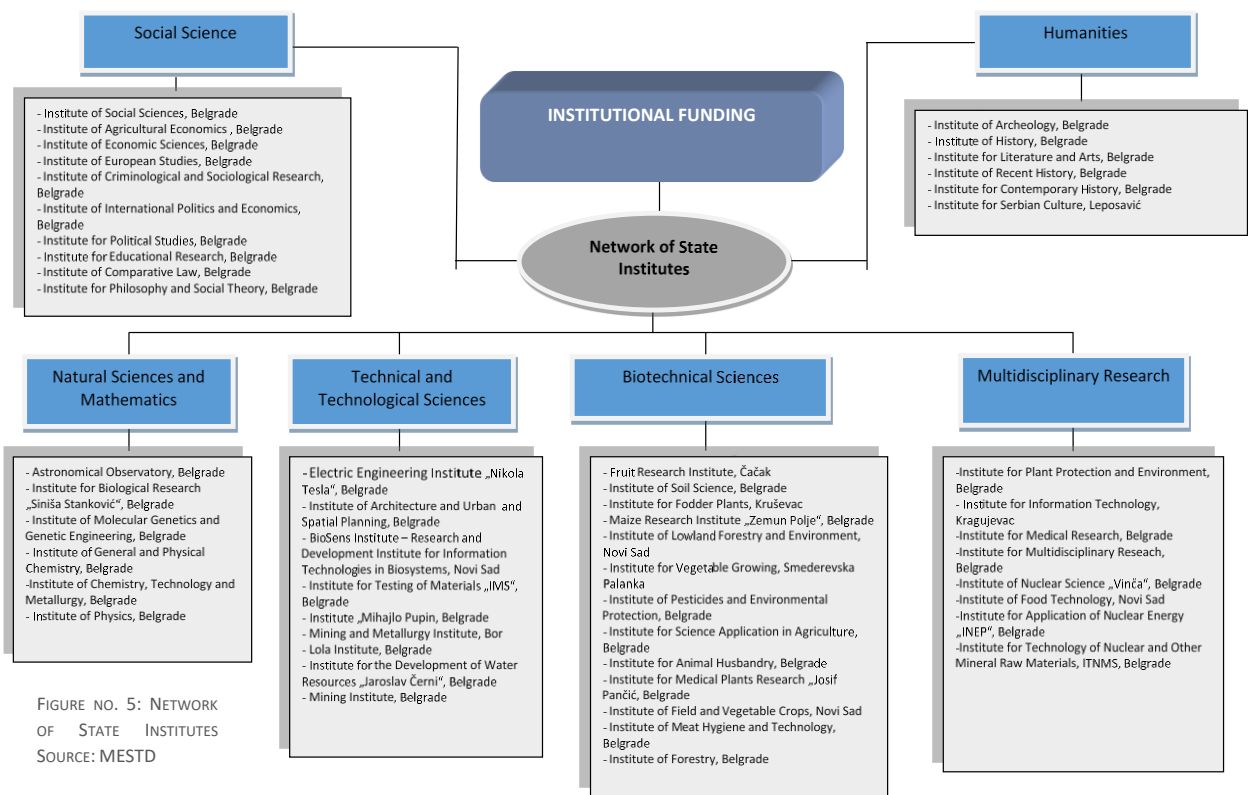


FIGURE NO. 5: NETWORK OF STATE INSTITUTES
SOURCE: MESTD

Along with the network of state institutes, institutes within the Serbian Academy of Sciences and Arts are also engaged in science and research. These are eight institutes based in Belgrade.

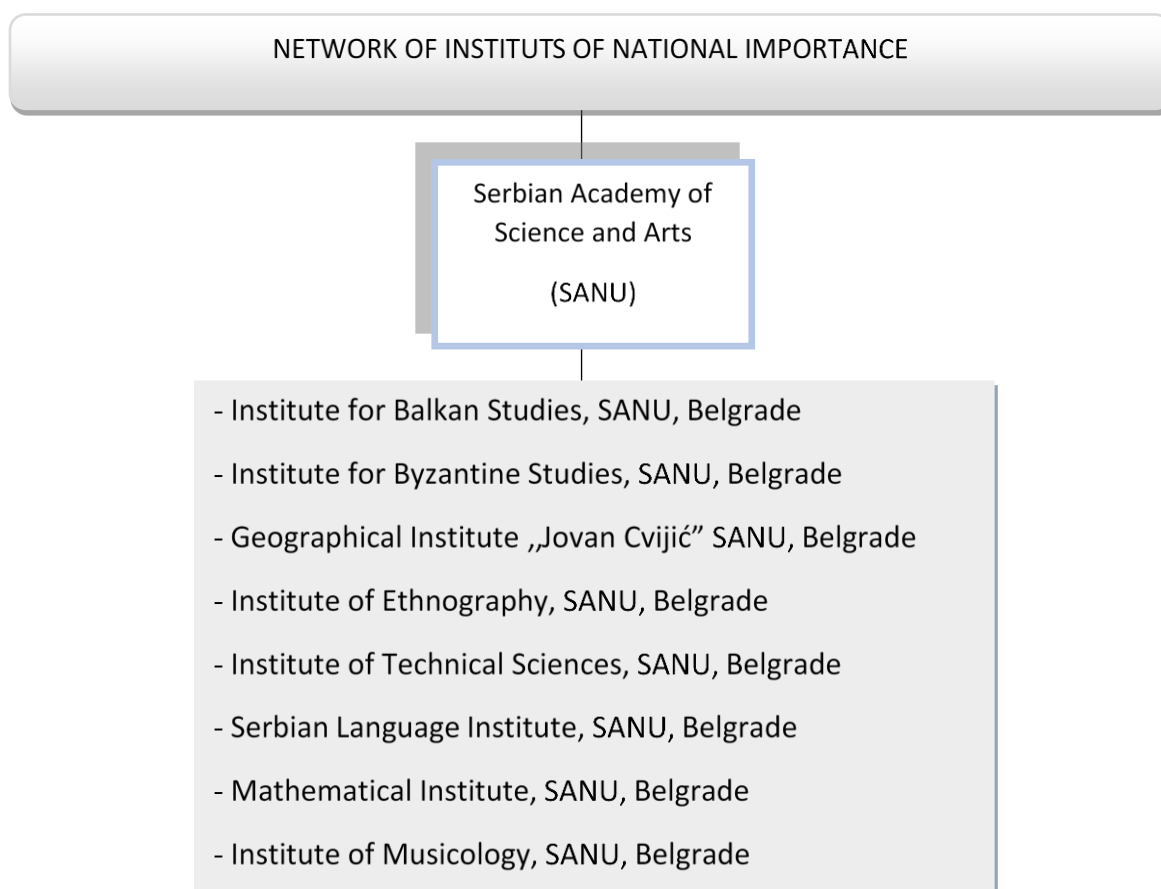


FIGURE NO. 6A: INSTITUTED FOUNDED BY THE SERBIAN ACADEMY OF SCIENCE AND ARTS.

SOURCE: MESTD

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In addition to the existing institutions of national importance with a long tradition (SANU, Matica Srpska), new institutions of national importance have been recognized under the Law on Higher

³² Figure no. 5 shows institutes founded by the Republic of Serbia and in jurisdiction of the Ministry of Education, Science and Technological Development, while Figure no. 6A shows institutes founded by the Serbian Academy of Science and Arts. Beside the above institutions conducting scientific research activities, there are also accredited institutes in the area of defense, health and agriculture.

Education and the Law on Science and Research. The University of National Importance is the University of Belgrade.

Institutes of national importance are: the Institute of Physics, the Institute for Biological Research "Sinisa Stankovic", the Institute of Chemistry, Technology and Metallurgy, the Institute of Field and Vegetable Crops Novi Sad, the Institute of Nuclear Sciences "Vinca" and the Institute for Medical Research. The role of these institutes is the development of the general fund of knowledge, raising the technical and technological level, valorization of research results and dissemination of knowledge, education and training of staff for scientific research. Six institutes of national importance for the Republic of Serbia formed a network and concluded an agreement on scientific cooperation (Figure 6b).



The Institute of Information Technologies Kragujevac was founded in June 2019 with the aim of linking several scientific fields by applying information technologies in natural science and mathematics, technical and technological, medical, biotechnical and social sciences, therefore enabling the increase in scope and quality of scientific research, while the multidisciplinary research has been improved.

BioSense Institute - a research and development institute for information biosystem technologies, founded in 2015, is dedicated to research and development of information biosystem technologies as well as modern applied and market-oriented research in the field of agriculture and food. Through multidisciplinary research, the BioSens Institute connects two very promising sectors in the Republic of Serbia: ICT and agriculture.

In addition to the establishment of new institutions, the implementation of capital projects aimed at expanding the capacity and infrastructure of existing science research organizations is underway. Based on the 2019 report of the Council for Innovative Entrepreneurship and Information Technology, the improvement of innovation infrastructure is realized through the following projects:

construction of BioSense Institute worth 28 million euros, construction of the second phase of the Science and Technology Park in Novi Sad, construction of Multifunctional laboratory in Niš worth 6.5 million euros, extension of the building of the Faculty of Organizational Sciences in Belgrade worth 7.1 million euros, construction of two facilities within the project "Verokio" of the Institute of Physics Belgrade, expansion of SRP Belgrade, construction, reconstruction and extension of buildings of faculties in the Republic of Serbia within the project "Improvement and Strengthening of the Capacity of University Education in the Republic of Serbia" with a projected budget of 95 million euros, as well as the establishment of a center for artificial intelligence, robotics and educational technology in Novi Sad with a projected budget for 2020 of 1.7 million euros.

III FUNDING STRUCTURE

One of the key preconditions for the further development of science is the increase in allocations that was achieved in the previous period. Observed in the broader context of comparative data in relation to the European Union, investment in research and development in the Republic of Serbia is still far below the European average (Figure 7). On the other hand, there is a constant increase in investment in research and development as a share of GDP.

In absolute terms, in the analyzed ten-year period, the investment increased from RSD 24.94 billion in 2009, to RSD 46.62 billion in 2018.³³

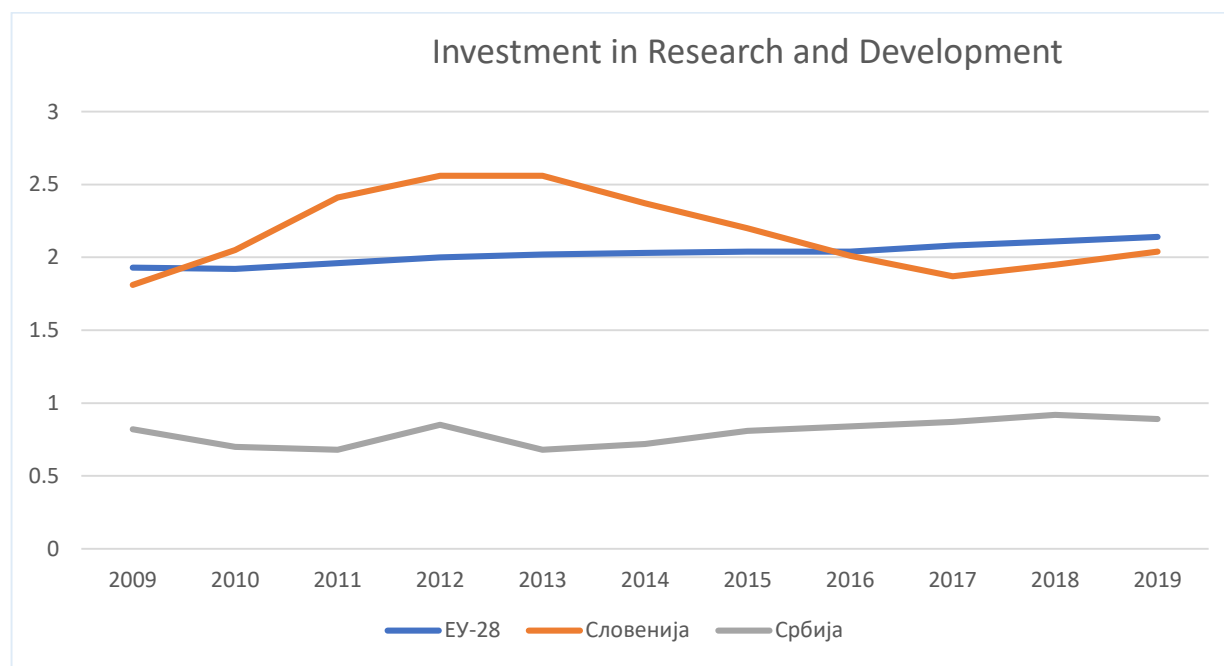
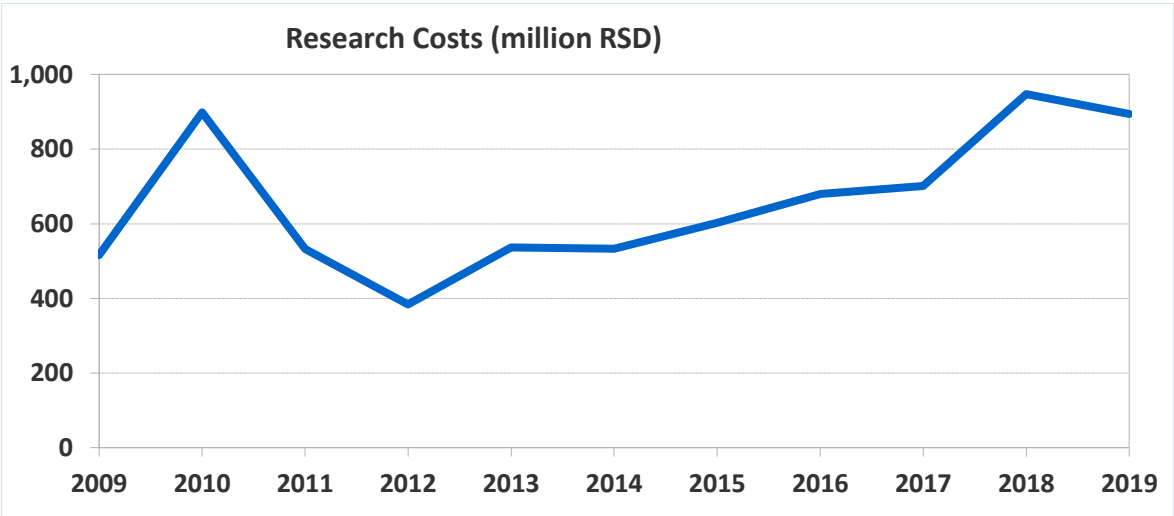
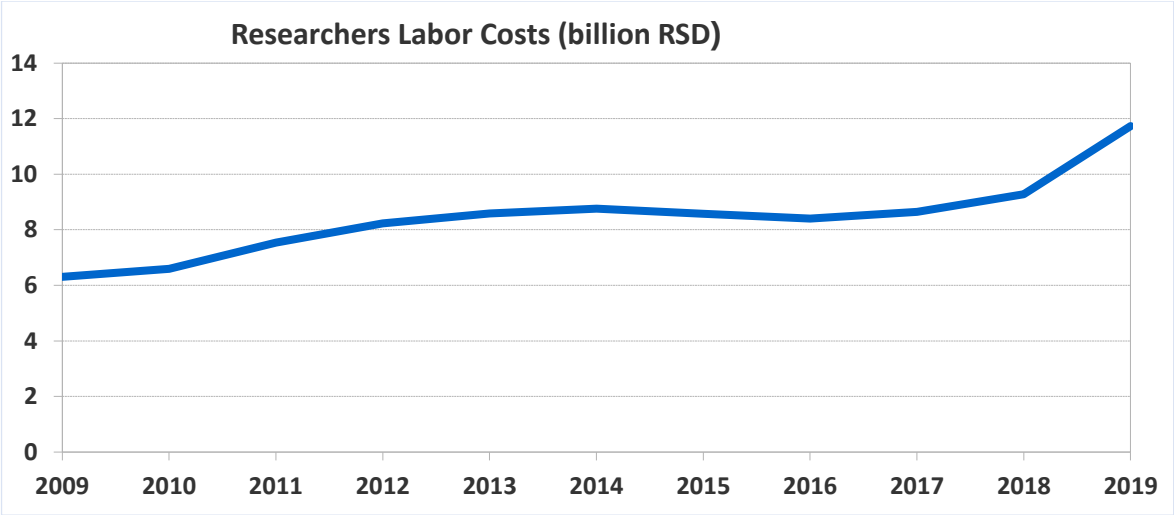


Figure no. 7: Investments in science and development as a percentage of GDP in the period 2009–2019; (comparison between the Republic of Serbia, the European Union average and Slovenia). Source: Eurostat.

After the fall caused by the financial crisis, budget funds have been consolidated and boosted. As shown in Figure no. 8, all three components of investment in science have been increased in parallel: labor costs, overhead costs and research costs, which will ensure further growth of the sector in the coming years. It should be emphasized that the share of research costs in the total investment is

³³ Source: Statistical Office of the Republic of Serbia.

relatively low, and that it is necessary to work on increasing it. A detailed structure of funding for the scientific research sector is given in Annex no. 3.



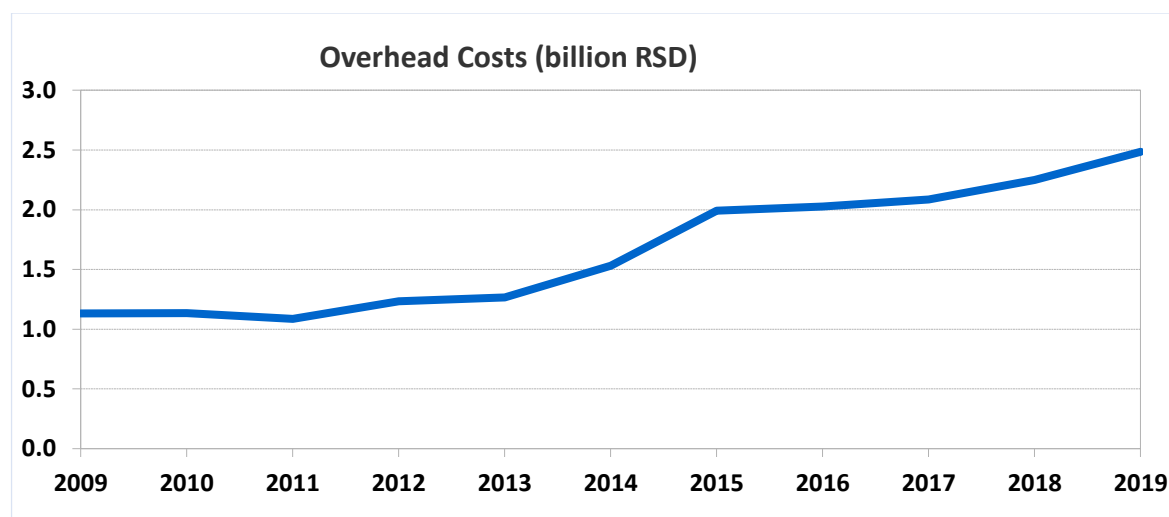


Figure No.8: Structure of research funding in the period 2009–2019(a. researchers labor costs, research costs and overhead costs). Source: MESTD.

A comparative analysis of all sources of funding for the scientific research and innovation system of the Republic of Serbia and the EU28 in 2018 shows that in Serbia allocations stemming from all sources, expressed as a percentage of GDP, are still lower than in Europe. At the same time, if expressed in absolute amounts, the allocations are smaller by an order of magnitude.

The key difference is in the funding structure - compared to the EU, particularly small allocations stem from the business sector. In order to ensure the continuation of the dynamic growth of the science research and innovation system, it is necessary to increase the allocations from the budget and introduce incentive measures for the business sector to invest in research conducted by science research organizations.

Table no. 2: Funding structure in 2018³⁴

	2018	EU 28	Serbia	EU 28/SRB (%GDP)	EU 28/SRB (EUR)
1.	State – SROs	0.54	0.37	1.46	7.33
2.	State – Business Sector	0.07	0.02	3.50	16.29
3.	EC – Business Sector	0.14	0.17	0.82	4.20
4.	EC - SROs	0.06	0.02	3.00	12.00
5.	Business Sector - SROs	0.05	0.02	6.80	9.69
6.	Business Sector – Business Sector	1.19	0.07	17.00	89.98
7.	State allocation (1+2)	0.61	0.39	1.56	7.84
8.	SROs income (1+4+5)	0.65	0.41	1.59	7.74
9.	Development in the business sector (2+3+6+5)	1.45	0.28	5.18	25.40
10.	EC allocation	0.20	0.19	1.05	5.16

Table no. 2 shows the structure of investment in research and development by funding sources. The most important sources of funding are the state, the European Commission (EC) and the business sector. The beneficiaries of the funds are scientific research organizations (SROs) and the business

³⁴ Source: <https://ec.europa.eu/eurostat/data/database>

sector. A comparative analysis of all investment flows from sources toward beneficiaries in the Republic of Serbia and the entire EU in 2018 is also shown (source: Eurostat). The data show that the state's investment in research implemented by SROs in 2018 was by 46% higher in the EU than in the Republic of Serbia. This gap is significant, and if we take into account the difference in the absolute amount of GDP in the EU and the Republic of Serbia, the difference is 7.33 times larger. Also, the investments of the European Commission in research and development in the business sector and SROs, are significantly lower, but still at a comparable level. In conclusion, funds received by SROs from the state and the European Commission are by 59% higher in the EU than in the Republic of Serbia, i.e., 7.74 times higher in absolute terms. In contrast, the allocations for research and development to the business sector are dramatically lower, as can be seen from the table and the chart presentation in Figure no. 9.

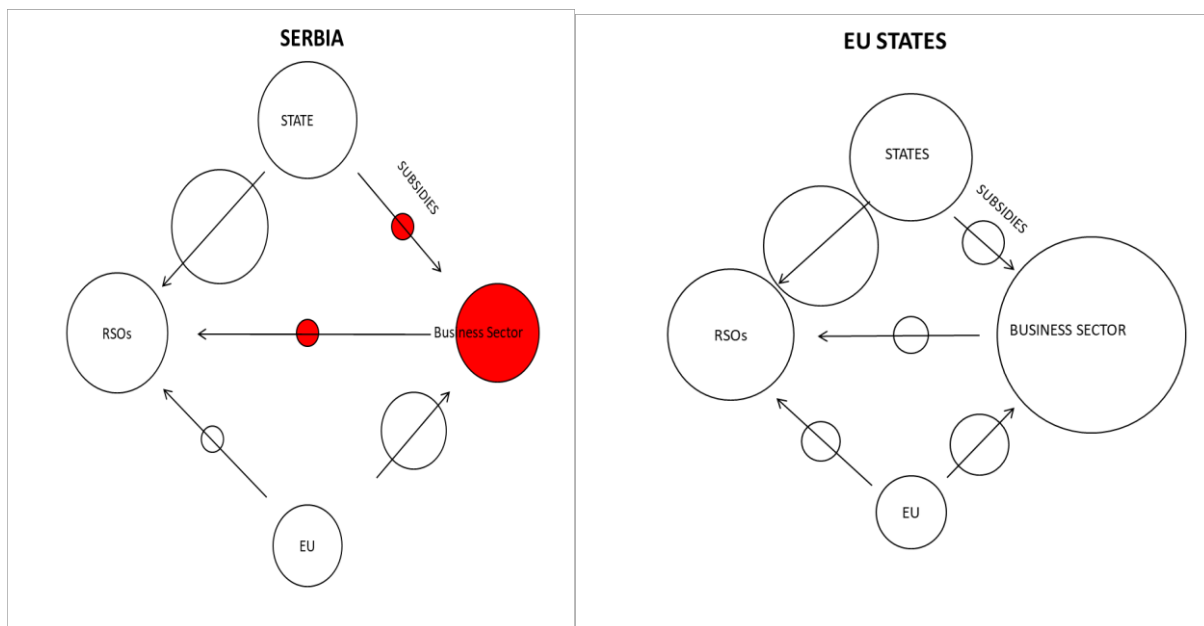


Figure no. 9A: Science funding structure in the Republic of Serbia in 2019 – relative shares of different sources. Source: Eurostat.

Figure no. 9B: Science funding structure in the European Union in 2019 - relative shares of different sources. Source: Eurostat.

Figure no.9 presents results summarized in Table no.2, indicating the main sources of funding and researchers: state, business sector, EU and RSOs. The area of the circles is proportional to the amount of investment in research, expressed as a percentage of GDP. Arrows indicate investment directions. Figure no.9A shows data on investments in the Republic of Serbia, while 9B represents the European Union. By comparing these two Figures, we conclude that the state's investments in research, as well as the efficiency of using European Union funds through international projects in which RSOs and the business sector participate, are at a significantly lower, but still comparable level. However, the Republic of Serbia does not achieve satisfactory results when it comes to the investment of the business sector in research and development, as well as when it comes to state incentive measures to promote research and development in the business sector (marked in red on the chart).

IV HUMAN RESOURCES

The analysis of available statistical data (Eurostat) shows that the total number of researchers (FTE) in the Republic of Serbia and the European Union (EU28) has continuously recorded a slight increase in previous years. However, in 2020, the Republic of Serbia still had half as many researchers per thousand inhabitants than the European average, which is a challenge that this Strategy faces through various measures (Figure 10a).

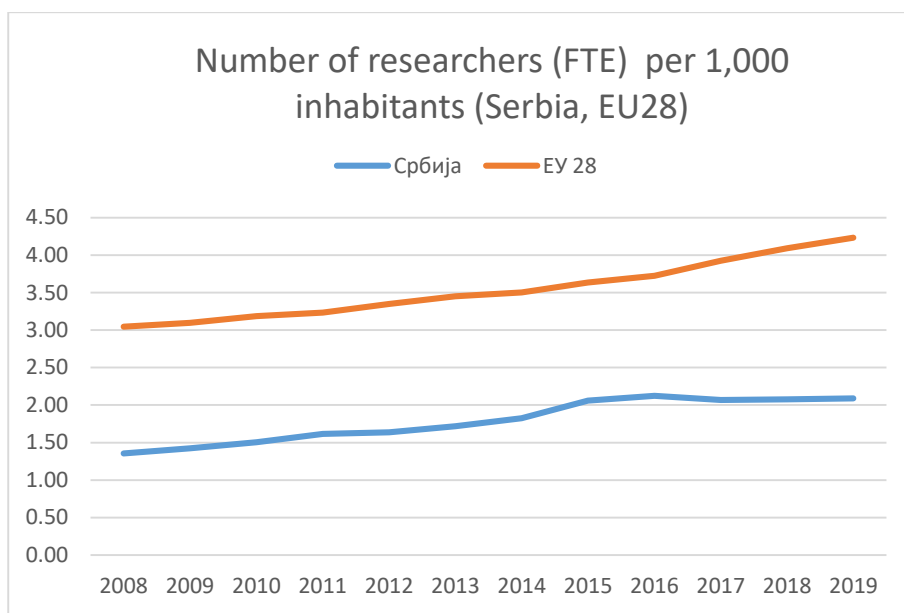


Figure no. 10A - Number of researchers in the Republic of Serbia and the European Union per thousand inhabitants in the period 2008–2019. Source: Eurostat and the Republic of Serbia Statistical Office.

The personnel structure indicates reasons why the total number of researchers is half as many in Serbia than in the EU28. Namely, this difference is especially pronounced in the business sector, which is dominant in the EU28, while in the Republic of Serbia it is exceedingly small (research and development centers in the business sector are lost in the privatization process). Research capacities in the business sector account for a significant share in the personnel structure in several most developed countries (Germany, Great Britain, France, the Netherlands and others), which are characterized by high added value. On the other hand, middle income EU countries (e.g., Slovenia, Portugal) have a structure similar to the Republic of Serbia (Figure 10b), which shows that the number of researchers in the business sector is modest. In order to increase this number, there are two available mechanisms. On the other hand, measures to encourage cooperation between the business sector and science can have a positive effect on the direct increase in the number of researchers in the business sector. In both cases, it is necessary to efficiently harmonize the educational, scientific research and innovation system with the needs of the economy.

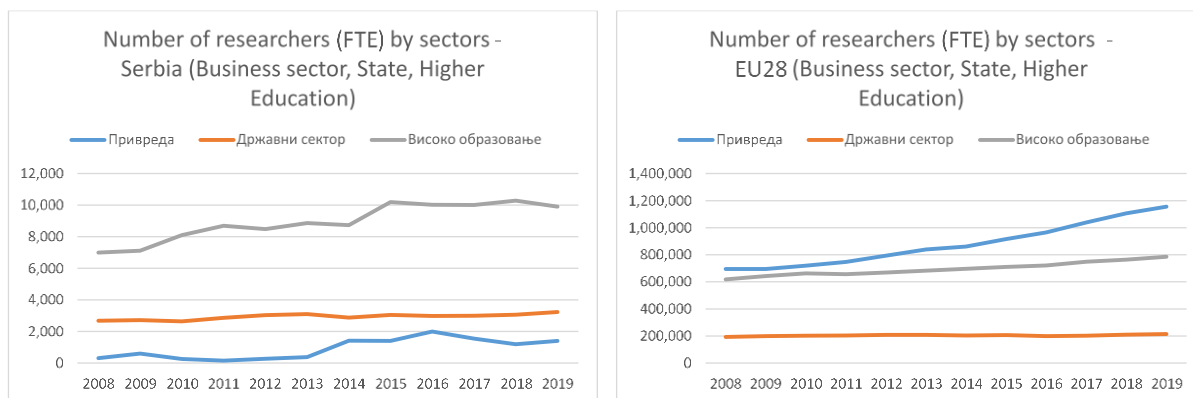


Figure no. 10B: Total number of researchers per sector in the period 2008–2019. (b: Republic of Serbia; c: European Union). Source: Eurostat and the Republic of Serbia Statistical Office.

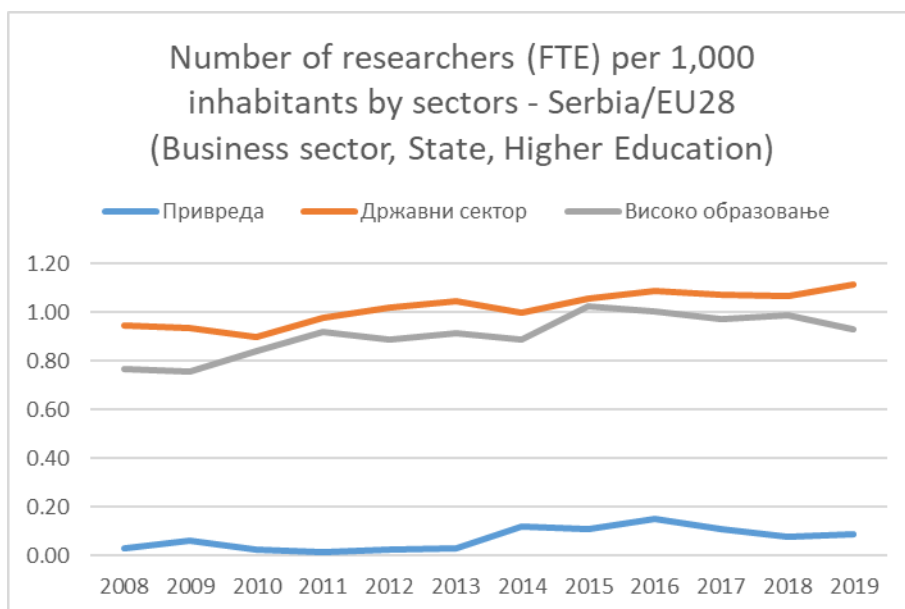


Figure no. 10G: Ratio of the number of researchers in the Republic of Serbia and the European Union per thousand inhabitants in the period from 2008–2019. Source: Eurostat.

On the other hand, the average age of research staff in the Republic of Serbia is statistically favorable - during the period from 2010 to 2019, it was below 45 years of age. Staff rejuvenation occurred in two waves of employment: at the beginning of the previous project cycle (2010–2011) and in the last two years of the systemic approach (Figure 10d).

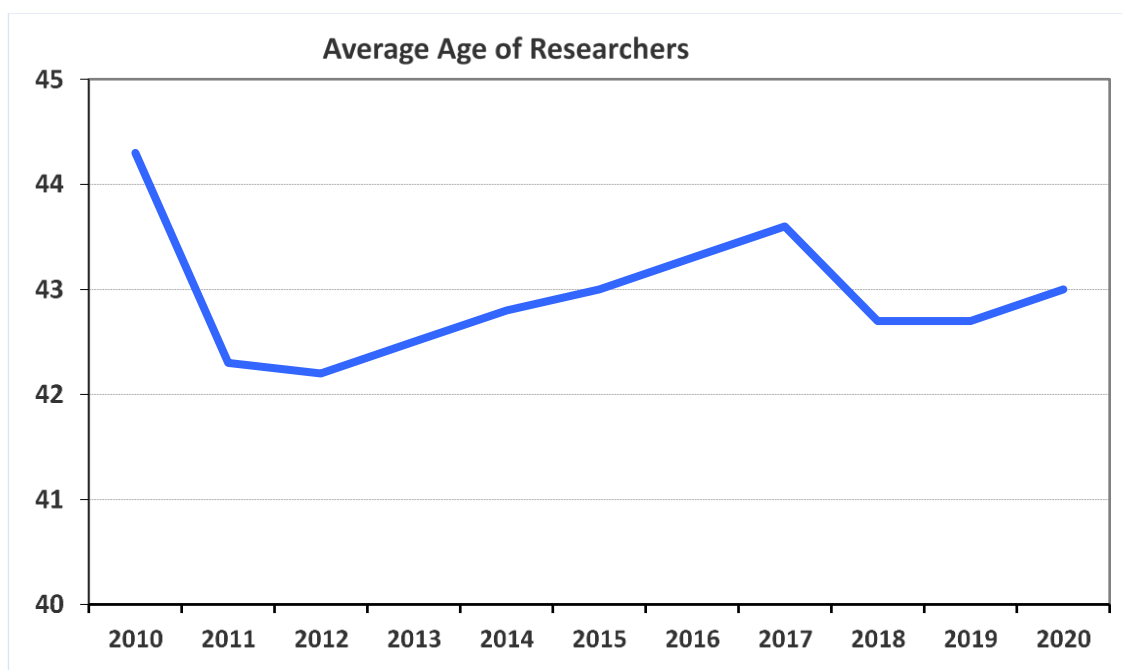


Figure no. 10D: Average age of researchers in the Republic of Serbia in the period 2010–2020. Source: MESTD.

According to the Eurostat survey in the Republic of Serbia, the representation of women researchers in all areas is 51.4%³⁵, while in management positions 34%.³⁶ Also, women are in the position of directors in as many as 5 out of 6 institutes of national importance³⁷. Although the Republic of Serbia is one of the leaders in the number of women in science in relation to the total number of researchers, there is room for improvement. It is necessary to provide systemic support to women for developing STEM careers and to encourage women researchers to apply for management positions.

V REVIEW OF THE IMPLEMENTED MEASURES DEFINED IN THE PREVIOUS STRATEGY

Taking into account the tendency to maintain continuity of success in the sector of science and technology, in addition to the analysis of the contribution of the Republic of Serbia to global science, the state of institutions and human resources, as well as the funding structure, it is necessary to consider the degree of realization of measures in the period from 2016 to 2020.

The previous strategy was adopted by the Government on March 3, 2016 under the motto "Research for Innovation", the general objective of which was "to improve the efficiency and effectiveness of the scientific research system", with six specific objectives:

- Encouraging excellence and relevance of scientific research in the Republic of Serbia;
- Strengthening the connection between science, economy and society to encourage innovation;

³⁵ Source: <https://ec.europa.eu/eurostat/databrowser/view/tsc00006/default/table?lang=en>

³⁶ Source: MESTD

³⁷ Source: MESTD

- Establishing an effective management system for science and innovation in the Republic of Serbia;
- Ensuring excellence and the availability of human resources for science and economy and social affairs;
- Improving international cooperation in the field of science and innovation
- Increasing investment in research and development through public funding and encouraging the investments of the business sector in research and development.

Each of these six specific objectives included a specific package of appropriate measures. Although significant results were achieved during the period of validity of the previous strategy in the science, technology and innovation sector, the measures from the Strategy itself were implemented with varying degrees of success.

Based on the annual reports of the National Council for Scientific and Technological Development and Analysis of the Ministry of Education, Science and Technological Development, it is perceivable that some measures have been fully implemented, some partially, and there are a number of measures that have not been implemented:

During the validity of the previous strategy, three key results were achieved:

- Establishment of institutional funding;
- Establishment of the Science Fund of the Republic of Serbia;
- Significant increase in the budget allocation for science.

In addition, the following results were achieved: better personnel age structure, establishment of new SROs and science and technological parks, integration into international scientific organizations (CERN) and strengthening the work of the Innovation Fund.

However, the previous strategy also had weaknesses, primarily in terms of identifying priorities. Also, some of the planned objectives were not achieved or were only partially achieved. It refers to:

- Planned reform of the network of institutions;
- Planned increase in the level of business sector investment in research and development.

Qualitative assessment of the implementation of individual measures, within the set objectives is shown in Table no. 3A based on the Report of the National Council for Scientific and Technological Development on the state of science in 2016, 2017, 2018 and 2019, with proposals and suggestions for the next year, as well as financial reports and plans of the Ministry of Education, Science and Technological Development and adopted legal acts.

Table no. 3a: Review of the Implemented Measures Defined in the Previous Strategy

Specific Objective 1 Encouraging Excellence and Relevance of Scientific Research in the Republic of Serbia			
Measures	Accomplished	Partly Accomplished	Unaccomplished
1. Strengthening of basic research			x

2. Introduction of targeted basic research			x
3. Improvement of technical and technological research			x
4. Improving the system of evaluation of scientific research		x	
5. Changes in the model of financing scientific research	x		
6. Establishing the Fund for Research Promotion	x		
7. Development of scientific research infrastructure		x	
8. Promotion of science and innovation		x	
Specific Objective 2 Strengthening the Link Between Science, Economy and Society to Encourage Innovation			
Measures	Accomplished	Partly Accomplished	Unaccomplished
1. Encouraging the application of scientific research results		x	
2. Strengthening the work of the Innovation Fund	x		
3. Further development of the Serbia Innovation Project	x		
4. Establishment of joint innovation projects of the private sector and scientific research organizations	x		
5. Improving the transfer of knowledge and technology		x	
6. Encouraging the establishment of companies based on the scientific research work ("spin-off")		x	
7. Establishing a public-private partnership			x
8. Science Technology Parks	x		
9. Establishing research and development clusters and competitiveness networks			x
Specific Objective 3 Establishing a More Efficient System of Management of Science and Innovation in the Republic of Serbia			
Measures	Accomplished	Partly Accomplished	Unaccomplished
1. Improving the institutional framework		x	

2. Establishment of strategic management of scientific research organizations			x
3. Reforming the network of institutes			x
4. Policy mix peerreview	x		
Specific Objective 4 Ensuring Excellence and Availability of Human Resources for Science and Economy and Social Activities			
Measures	Accomplished	Partly Accomplished	Unaccomplished
1. Improving the legislative framework for the development of human resources	x		
2. Improving the program of doctoral studies			x
3. Involvement of young researchers in projects	x		
4. Strengthening the cooperation with the diaspora		x	
5. Improving the mobility of researchers		x	
6. Improving gender and minority equality in science and innovation		x	
Specific Objective 5 Enhancing International Cooperation in the Field of Science and Innovation			
Measures	Accomplished	Partly Accomplished	Unaccomplished
1. Establishing a coordination body for international cooperation			x
2. Strengthening participation in the European Framework Program for Science and Innovation Horizon 2020		x	
3. Strengthening regional cooperation in the Western Balkans and the Danube region		x	
4. Ensuring access to international research infrastructure	x		
Specific Objective 6 Increasing Investments in Research and Development by Improving Public Financing and Encouraging Business Sector Investments into Research and Development			
Measures	Accomplished	Partly Accomplished	Unaccomplished

1. Increasing investments in research and development from public sources	x		
2. Increasing the business sector investments into research and development			x
3. Investments in research and development from other national and international sources		x	

During the previous strategic period, measures to strengthen basic research, introduce targeted basic research and improve technical and technological research, which were envisaged by specific objective 1 (Encouraging Excellence and Relevance of Scientific Research in the Republic of Serbia) were not realized because during the validity of the Strategy on Scientific and Technological Development of the Republic of Serbia for the period 2016 to 2020 "Research for Innovation" no new research programs were launched³⁸³⁹. Based on the implemented reforms and changes in the system of financing scientific research, this strategy envisages a new approach, as well as a number of specific incentives, described in measures in Specific objective 3.

The measure envisaging the improvement of the system of evaluation of scientific research was partly achieved thanks to the analysis of achieved science results which, for funded projects, were made by appropriate relevant scientific committees, and which used precise bibliometric indicators to analyze science outcomes.⁴⁰ This strategy envisages a new approach that implies a comprehensive increase in the efficiency of the coherence of the scientific research and innovation system, which is given by the measures in the specific objective 2.

The measure envisaging the development of scientific research infrastructure was partially realized because only a part of the planned projects managed by the Project Implementation Unit⁴¹ was realized (for more details, see the section II Institutional Framework). The measure envisaging the promotion of science and innovation was partially realized through the activities of the Center for the Promotion of Science, with the aim of increasing the visibility of research and SROs activities in the field of science communication.

The measures envisaging the change of the model of financing scientific research and the establishment of the Fund for Research Promotion have been fully implemented with the adoption of the Law on Science and Research ("Official Gazette of RS", No. 49/19) and the Law on the Science Fund of the Republic of Serbia. ", No. 95/18), which established the

³⁸ Report of the National Council for Scientific and Technological Development on the state of science in 2019, with proposals and suggestions for next year.

³⁹ Report of the National Council for Scientific and Technological Development on the state of science in 2016, with proposals and suggestions for next year.

⁴⁰ Report of the National Council for Scientific and Technological Development on the state of science in 2017, with proposals and suggestions for next year.

⁴¹ Report of the National Council for Scientific and Technological Development on the state of science in 2018, with proposals and suggestions for next year.

preconditions for substantial improvement of the system and implementation of the measures envisaged by this strategy.

Measures for establishing public-private partnerships and establishing research and development clusters and competitiveness networks, which were envisaged by Specific Objective 2 (Strengthening the Link between Science, Economy and Society to Encourage Innovation in Basic Research) were not realized due to lack of economic capacity to invest in science.⁴² Given that for their realization it is necessary to carry out previous structural reforms, which will already strengthen the innovation system, the introduction of a new legal framework has completely abandoned these measures. In specific objectives 2 and 3, this strategy envisages measures to link science and the economy more efficiently.

Thanks to investments through the Innovation Fund, development of science and technology parks and at the same time, strengthening of applied research, measures have been partially achieved to encourage the application of science research results, improve knowledge and technology transfer and encourage the establishment of companies based on research, which is discussed in more details in the sections Institutional Framework and Science Funding. Thanks to that, during the strategic period, the position of the Republic of Serbia in the index base of the World Economic Forum improved, and the number of registered patents per million inhabitants increased significantly.

At the same time, the measures related to strengthening the work of the Innovation Fund, development of the Innovation Support Project, establishment of joint innovation projects of the private sector and scientific research organizations and further expansion of the network of science and technology parks have been fully implemented, which is a precondition for the implementation of the measures envisaged by this strategy in Specific Objective 3.

Measures for the establishment of strategic management of scientific research organizations and reform of the network of institutes that were envisaged by Specific Objective 3 (Establishing a More Efficient System of Management of Science and Innovation in the Republic of Serbia) have not been implemented.⁴³ Their realization was not even approached during the strategic period because it was previously necessary to change the legislative and institutional framework. With the adoption of the Law on Science and Research ("Official Gazette of RS", No. 49/19) and the Law on the Science Fund of the Republic of Serbia ("Official Gazette of RS", No. 95/18), the institutional framework has changed significantly, so this measure was partially implemented, while its implementation requires further application of the above laws, which is the basis for the measures envisaged by this strategy in Specific Objective 2.

The measure for improving the program of doctoral studies, which was envisaged by Specific Objective 4 (Ensuring Excellence and Availability of Human Resources for Science and Economy and Social Activities) has not been realized. Four programs for the improvement of human resources (staff training, scholarships for young and talented people, procurement of science and professional literature, publication of science publications), inherited from the

⁴² Report of the National Council for Scientific and Technological Development on the state of science in 2019, with proposals and suggestions for next year.

⁴³ Report of the National Council for Scientific and Technological Development on the state of science in 2016, with proposals and suggestions for next year.

strategic period 2010-2015, with additional investments continued in the period of validity of the previous strategy.⁴⁴

Measures to strengthen cooperation with the diaspora and increase the mobility of researchers have been partially achieved through the intensification of the Program for co-financing the participation of researchers in international scientific conferences, as well as the Program for co-financing international conferences held in the country. The measure of promoting gender and minority equality in science and innovation has been partially achieved through a series of campaigns and individual SROs projects.

The improvement of the legal framework for human resources development has been fully achieved through the adoption of the Law on Science and Research ("Official Gazette of RS", No. 49/19). The measure of including young researchers in projects has been fully realized. The measure was implemented in two ways, through calls by the MESTD and programs of the Science Fund of the Republic of Serbia. 1,376 young researchers were involved in the MESTD calls. Through the Program for Excellent Projects of Young Researchers (PROMIS), the goal of which is to include young researchers in scientific research, 59 grants were awarded to project teams and funds in the total amount of nine million euros were distributed. More details are given in Annex 3.

The measures envisaged by Specific Objective 5 (Enhancing International Cooperation in the field of Science and Innovation) have been implemented through bilateral and a number of multilateral projects and actions, as well as through individual cooperation of our researchers with researchers throughout the world. A coordination body for international cooperation has not been formed, which is envisaged by this strategy in the first year of implementation. During the strategic period, measures to strengthen participation in the European Framework Program for Science and Innovation Horizon 2020 were partially achieved, as well as the strengthening of regional cooperation within the Western Balkans and the Danube region. Incentives for researchers have led to greater success in winning projects that strengthen excellence, so that the Republic of Serbia has achieved notable results at the regional level, but still significantly below the average for the European Research Area. On the other hand, the measure of providing access to the international research infrastructure has been fully realized. The Republic of Serbia has become a full member of CERN and at the same time has joined a number of international programs to strengthen the scientific infrastructure.

The realization of the measures envisaged by the Specific Objective 6 (Increasing Investments in Research and Development by Improving Public Financing and Encouraging Business Sector Investments into Research and Development) marked the last phase of the previous strategic period. There has been a significant increase in investment in research and development from public sources, as well as a partial increase in investment from other national and international sources. The increase of business sector investment in research and development has not been achieved, which is what the measures in Specific Objective 1 are dedicated to. More details on investments can be found in the section Science Funding.

⁴⁴ Report of the National Council for Scientific and Technological Development on the state of science in 2018, with proposals and suggestions for next year, page 35.

Taking into account the level of implementation of measures, it can be concluded that the previous strategy was ambitious, but also insufficiently focused. Significant successes in the last two years of the strategic period represent the basis for further dynamic growth.

VI. SWOT ANALYSIS

The potential for further dynamic growth of the scientific and technological system depends on the assessment of strengths, weaknesses, opportunities and threats. These assessments are obtained by looking at the state of the system itself, as well as the related sectors it is connected with.

Table No. 3b: SWOT Analysis

Strengths	Weaknesses
– quality of education; – tradition of scientific research; – strengthened scientific research sector through structural reforms; – excellent international network of researchers; – high international reputation and influence of certain disciplines.	– fragmented scientific research space with subcritical research capacities; – insufficient recognition of institutions at the wider regional, European and global level; – lack of administrative procedures, practices and capacity to attract investments and projects; – insufficient investments in scientific research infrastructure and in direct material costs of research; – insufficient degree of conversion of achieved scientific research results into added value for the economy, state and society as a whole – insufficient technology transfer capacities.
Opportunities	Threats
– growing trends of the national economy; – extensive scientific diaspora; – EU and regional integration processes and established strategic partnerships; – global growth trend of high-tech sectors including ICT.	– long-term declining demographic trends; – increased risks at the global level (security, health and other); – drastic increase in investment in science in other countries and the risk of the departure of the most qualified staff and technological lag.

The previous analysis shows that the continuity of strengthening the scientific research and innovation system can be maintained by simultaneous measures to raise the quality of basic research and technological development, improve the state of human resources and sustainably increase funding for science and technology.

In order to maintain and accelerate the observed trend of reducing the gap with Europe the following is needed:

- increase the number and quality of researchers;
- increase the budget and direct it towards priority areas;
- increase the efficiency of institutions and research teams.

DESIRED SITUATION AND OBJECTIVES OF THE STRATEGY

Science is expanding the fund of knowledge and developing technologies that help us deal with problems, both existing and new ones, including those that are currently impossible to predict, but which will certainly appear in the future. The rapid social changes resulting from the development of new technologies in the XXI century have no precedent in human history in terms of their dynamic.

New technologies have the potential to completely change market conditions, the way of communication, transport and trade, to create new needs and life habits. Such technologies divide the world into two categories – to those who develop, use and successfully adapt to change, and to those who fail to bridge the emerging technological and social gap. The Republic of Serbia recognized these global trends and adopted the Strategy with the intention of strengthening scientific research institutions, human resources and administrative frameworks, in order to bring it to the desired state in which it will be able to respond quickly and efficiently to social challenges.

Through the Strategy implementation, the citizens of the Republic of Serbia can expect better quality of life through scientific and technological progress in the fields of health, security, education and preservation of national identity. In accordance with the given legal framework, and according to the state of science in the Republic of Serbia, the Strategy on Scientific and Technological Development defines the desired state, i.e. the vision of development for the period from 2021 to 2025. In order to achieve the desired state, the Strategy envisages one general and five specific goals, as well as measures for their realization.

Desired state (vision)

At the end of the strategic period, the scientific research and innovation system of the Republic of Serbia was improved, and it is now characterized by the following:

- strong scientific research institutions, recognizable and competitive at the regional and European level, capable of independently solving complex problems and providing relevant answers to social challenges within their scope of work;
- world-renowned leading researchers;
- research teams capable of participating in competitive projects and creating new knowledge, technologies and jobs.

The desired state represents an important step forward in the quality and impact of the actors of scientific research and innovation system. Strengthened and reformed scientific research institutions, research teams and individuals will be an important development resource of the Republic of Serbia and support in crisis situations.

General objective of the Strategy

The general objective of the Strategy on Scientific and Technological Development of the Republic of Serbia for the period 2021-2025 is as follows: **Scientific and technological and innovation system contributes to the accelerated development of the Republic of Serbia through the improvement of the quality and efficiency of science, technological development and innovation and further integration into the European Research Area, thus helping to reach the standards of developed economies.**

The general objective will lead to the desired state when high quality of research staff, scientific results and infrastructure is achieved, as well as the efficient management and use of available resources, focused development of new technologies and strengthening of the economy and its competitiveness, including providing relevant responses to social challenges in order to increase social cohesion and quality of life, by providing professional support to decision-making at the state level and by

communicating scientific knowledge to society as a whole. Finally, scientific and technological and innovation system will help the transition of the Republic of Serbia from a developing to a developed economy, which can be measured according to the United Nations classification⁴⁵.

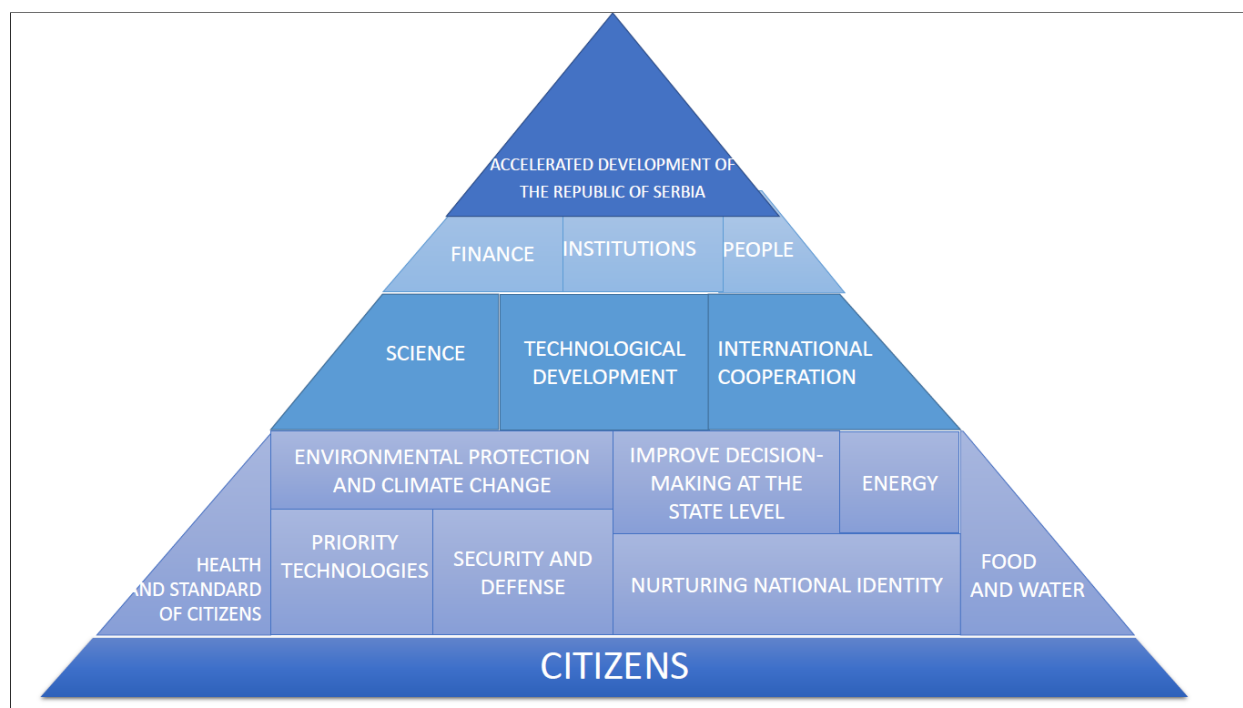


Figure No. 11: Pyramid of social challenges, objectives and effects of the Strategy

Specific Strategy objectives

In order to achieve the general objective of the Strategy, five specific objectives have been identified:

SO 1 – Provide the necessary conditions for the dynamic development of science, technological development and innovation.

SO 2 – Increasing the efficiency of using the resources of the scientific research system.

SO 3 – Nurturing the top quality of science and technological development and strengthening the competitiveness of the economy.

SO 4 – Focusing research to social challenges and priorities.

SO 5 – Strengthening international cooperation.

DESCRIPTION OF MEASURES FOR ACHIEVING THE OBJECTIVES OF THE STRATEGY

SO 1 – Provide the necessary conditions for the dynamic development of science, technological development and innovation

The continuation of the dynamic development of the scientific research and innovation system is a mandatory precondition for the accelerated development of the Republic of Serbia. Measures achieved under the previous Strategy and successes in structural changes in the financing of science have created the preconditions and environment in the scientific community for this objective to be achieved. However, the ability of this system to move forward directly depends on the vitality of its three key components, namely: structure and level of funding, quality of human resources and quality of

⁴⁵ Source: https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/WESP2019_BOOK-ANNEX-en.pdf

infrastructure. To achieve this specific objective, it would be necessary to implement measures that strengthen each of these three components of the system. In that sense, it would be necessary to establish (M. 1.1) targeted levels of funding, which means financing science from the budget in a broader sense, but also from international projects and the economy. This change necessarily requires (M. 1.2) HR development, (M. 1.3) strengthening scientific research infrastructure and (M. 1.4) strengthening digital infrastructure.

– Implementing entity: MESTD

– Indicator 1.1. Total allocation for science and technological development

– Indicator 1.2. Total number of researchers

– Indicator 1.3. Total funds for scientific research infrastructure including capital projects and equipment

M. 1.1. – Creating conditions to reach the target level of budget financing

The Republic of Serbia is still in the category of countries with relatively modest investments in science and development, and the objective of the measure is to increase these investments in order to reach developed countries that retain and increase their technological advantage with such investments. This is how the realization of the general objective of the Strategy will be ensured, but it will also directly contribute to the technological improvement of the Republic of Serbia. Also, the analysis of the current situation showed the key weakness of the system of funding of science and technological development is the identified insufficient investment of the economy in science. The purpose of this measure is to stimulate and strengthen the investment of the economy in science and development through financial and fiscal support.

This measure takes into account the structure of funding through the following components: direct allocations of the state for science, development in the economy (allocation of the state for development in the economy, allocation of the economy for science, allocation of the economy for development in the economy) and international projects for science and economic incentives for procurement of research and development services. Within the direct state allocations for science, the objective is to increase the share of funds for direct research costs to the desired level of 30%. The measure is realized by increasing direct budget allocations, EU funds (*IPA* and others), funds of the World Bank and other sources. Given the limited budgetary resources, the aim of this measure is to ensure that any budget investment is accompanied by investment from the economy, and vice versa. This approach should lead to a long-term gradual increase in total investment in science and development to reach and exceed the European average.

In addition to the increased budget, a significant effect is also achieved through fiscal support. In order to strengthen the connection between the economy and science, the Republic of Serbia, as part of this measure, introduces for the first time a systemic activity to support the procurement of research and development services. One of the successful examples of such activities is the Republic of Slovenia⁴⁶, which in the period from 2007-2012 manage to raise the investment of the economy from 0.8% to 2.0% GDP. Compared to the European Union's average, which is 1.2% GDP, Slovenia has moved from a category below average to above average category. The proposed activities are adapted to the needs of the Republic of Serbia, while eliminating the inherent shortcomings of similar examples in other countries.

Through the promotion of stimulating fiscal policy, the measure encourages the procurement of research and development services from public scientific research organizations. A taxpayer, an ordering party, may request a reduction of the tax based by the amount of 100% of the amount representing investments

⁴⁶ Source: Eurostat

in research and development in the current year, but not more than the amount of the tax base. The amounts determined for investments referred to in this paragraph shall be taken into account in accordance with the provisions of the law governing tax regulations. The taxpayer must define the procurement of services in the business plan or in a special development project or program.

- Implementing entity: MESTD

- Partner institutions in the implementation of activities: Science Fund of the Republic of Serbia, Innovation Fund, Ministry of Finance, Serbian Chamber of Commerce and other line ministries

- Indicator 1.1.1. State allocations for science and technological development

- Indicator 1.1.2. Number of realized tax reliefs for business entities based on the procurement of research and development services from a scientific research organization

M. 1.2. – HR Development

Investing in the development of scientific talent has positive effects on other segments of society, while the development of society is in proportion to the size of the research staff. Therefore, the objective of this measure is for the Republic of Serbia to reach the European average number of researchers per capita, which is twice as high as in the Republic of Serbia at the moment. The objective will be achieved through the programs and scholarships of the MESTD and the Science Fund of the Republic of Serbia for the inclusion of young researchers in scientific research; special programs of the Science Fund of the Republic of Serbia for reintegration of returnees from abroad, special programs of the Science Fund of the Republic of Serbia to increase cooperation with the diaspora and mobility, as well as programs for regional cooperation. Also, within this measure, in partnership with SROs and the non-governmental sector, the Center for the Promotion of Science will coordinate regional research centers with the aim of increasing the number of students interested in science.

- Implementing entity: MESTD

- Partner institutions in the implementation of activities: Science Fund of the Republic of Serbia

- Indicator 1.2.1. Young researchers newly involved in scientific research

- Indicator 1.2.2. Returnees from abroad involved in scientific research

- Indicator 1.2.3. Researchers foreign nationals

- Indicator 1.2.4. Researchers from diaspora involved in scientific research activities in the Republic of Serbia

- Indicator 1.2.5. Researchers from the region involved in scientific research activities in the Republic of Serbia

M. 1.3. – Strengthening the scientific research infrastructure

Having in mind the structural reforms that were implemented during the implementation of the previous Strategy, as well as the objective of the Strategy to ensure the strengthening of institutions and the best individuals, the measure will provide significant investments in capital equipment. Modern scientific research infrastructure and equipment are necessary in order for institutions and researchers to be adequately equipped to increase the effectiveness and efficiency of the implementation of institutional tasks, national and international projects, and especially to improve the competitiveness of science and the Serbian economy. Procurement, maintenance and access to capital equipment are a necessary precondition for successful and productive scientific research.

- Implementing entity: MESTD

- Partner institutions in the implementation of activities: Government, Science Fund of the RoS, PIMO, PIU, World Bank
- Indicator 1.3.1. Update of the Research Infrastructure Roadmap
- Indicator 1.3.2. Total value of capital projects
- Indicator 1.3.3. Total value of procured equipment

M.1.4. – Digital infrastructure development

Necessary conditions for the dynamic development of the scientific research and innovation system are especially related to the process of digitalization and the establishment of the information base in the form of a unified national scientific research information system: e-Science (*eNauka*). Modernization of the management of the scientific research sector with the use of information and communication technologies will lead to the connection of all available data, recording of scientific results and the use of information systems in the relevant administrative procedures prescribed by the law. In accordance with international practice and standards, the MESTD will, within its activities, actively assist in the digitization of scientific research results in cooperation with other significant institutions and legal entities.

- Implementing entity: MESTD
- Partner institutions in the implementation of activities: Office for IT and e-Government, Science Fund of the Republic of Serbia, SRO
- Indicator 1.4.1. Unified national system e-Science established, and it includes electronic databases and registers, including the Register of Scientific Research Organizations, the Register of Researchers and the Register of Capital Equipment
- Indicator 1.4.2. Publicly available dynamic internet presentation with profiles of researchers and scientific research organizations

SO 2 – Increasing the efficiency of using the resources of the scientific research system

Despite significant changes in the scientific sector in the previous strategic period, the number of scientists and infrastructure resources in the Republic of Serbia is still insufficient for the transformation that would have significant effects on society. Increasing the efficiency and coherence of the use of resources of the scientific research system will create preconditions for further sustainable progress of the scientific research and innovation system.

These processes must be approached with a long-term vision of SRO growth – through nurturing of scientific quality, increasing the number of researchers, replacing staff that is leaving the system, strengthening and expanding competencies.

The implementation of the Specific objective 2 requires public support, communication with citizens and strengthening cooperation with the economy. In that sense, it is necessary (M. 2.1) to rationalize the work of SRO, as the key institutions in the system, and especially (M. 2.2) to reform the network of institutes, as well as (M. 2.3) to increase the transparency of work and communication results of science in the society.

- Implementing entity: MESTD
- Indicator 2.1. A mechanism for monitoring of the implementation of scientific research work at the SRO level has been established
- Indicator 2.2. Number of reformed institutes
- Indicator 2.3. Total number of users of popular science programs

M. 2.1. – Regulating, rationalization and monitoring the implementation of the entire scientific research activity

Structural changes in the scientific research system, i.e. the transition to institutional funding, with additional funding through competitive projects of the Science Fund and the Innovation Fund, initiated in the previous period, will be implemented in this strategic period.

Having in mind the need to further increase the stability, competitiveness and efficiency of the system, it is necessary to adopt bylaws and regulations, both at the level of the MESTD and at the level of individual SRO, and implement appropriate mechanisms for control and monitoring of work results. The essential change is based on the introduction of institutional qualitative and quantitative success criteria which, along with the existing quality criteria of each researcher, will lead to the integration of scientific research resources, strengthening institutions and greater contribution of science and society. The incentive for strengthening institutional capacities will be realized by a measure that directly links the results at the level of SRO with the amount of their institutional financing. MESTD will perform periodic checks of the implementation of scientific research activities in the SRO, based on which it shall prepare a report. Based on these reports, with the support of the expert bodies of the MESTD, the norms and standards of financing will be harmonized with the increase of the quality of scientific work. In order to relieve the professional services of SRO, a single set of data required by the MESTD on an annual basis will be prescribed.

- Implementing entity: MESTD
- Partner institutions in the implementation of activities: Association of Institutes of Serbia, SRO
- Indicator 2.1.1. Program on institutional financing of SRO adopted
- Indicator 2.1.2. Reports on the quality of realization of scientific research activities of SRO
- Indicator 2.1.3. Adopted and harmonized norms and quality standards at the level of SRO
- Indicator 2.1.4. Prescribed a unique set of data that MESTD requires from SRO annually

M. 2.2. – Reform of the network of institutes

In this strategic cycle, the quality of scientific research work at the SRO level will be assessed through several steps. First, self-evaluation procedures will be conducted, followed by external evaluations, and the data will be used to optimize the network of scientific research organizations in the Republic of Serbia. The ultimate goal of this procedure is to raise the level of quality of scientific research work at the level of SRO, more efficient use of financial resources and equipment and achieving a critical number of researchers in certain disciplines. As part of the reform of the network of institutes, and based on the process of self-evaluation and external evaluation, pilot institutions will be selected to implement structural reforms, which is the first phase of this process.

- Implementing entity: MESTD
- Partner institutions in the implementation of activities: Center for the Promotion of Science, World Bank
- Indicator 2.2.1. Adopted methodology of self-evaluation and external evaluation
- Indicator 2.2.2. Number of conducted self-evaluations of SRO
- Indicator 2.2.3. Number of conducted external evaluations of SRO per year
- Indicator 2.2.4. Number of reformed institutes per year

M. 2.3 – Communication of scientific knowledge for the purpose of social usefulness and increased visibility of science

In order to increase the impact of science on the economy and society as a whole, it is necessary to increase the availability of scientific research results and developed technologies to stakeholders. Increasing transparency in the work of the scientific research sector will be achieved through the establishment of e-Services within each SRO, as well as on specialized e-platforms at the level of the Republic of Serbia. All scientific research results obtained through the use of public funds will be available on appropriate platforms harmonized with the standards of open science, open access and IP protection. The results of publicly funded research represent a public good, which can be exploited only if everyone has access to it, without restrictions. At the same time, all new jobs in the scientific research sector will be advertised on the central portal. Catalogs of services, scientific and professional competencies, technological solutions and intellectual property will be available on the website of a SRO.

The efficiency and coherence of the use of resources is also based on the opinion of a broader social community, so it is necessary to strengthen the communication between the society and the scientific research and innovation system. This measure includes the improvement of the work of specialized organizations such as the Center for the Promotion of Science, as well as the connection of scientific and educational centers on the territory of the Republic of Serbia. The CPS, with the appropriate support of the MESTD, could announce competitions for pilot programs of civic scientific research. All actors in the scientific sector are encouraged to organize trainings or support existing media trainings in order to raise the accuracy and quality of scientific information available to the public. In order to increase the quality of scientific information, SROs are encouraged to develop their own thematic popular science portals or to establish strategic partnerships with professional media. Also, SROs are encouraged to organize open days for citizens, public lectures and forums, with the aim of presenting scientific knowledge to stakeholders, but also helping the scientific sector learn about the needs, expectations and problems that the society is facing. Through the programs of the Science Fund, support will be provided to SROs, economy and media in the development of these forms of science communication.

– Implementing institution: MESTD

– Partner institutions in the implementation of activities: Center for the Promotion of Science, Office for e-Government, Science Fund of the Republic of Serbia, SRO

– Indicator 2.3.1. A network of research and educational centers has been established on the territory of the Republic of Serbia

– Indicator 2.3.2. Number of citizens who follow science-inspired media content

– Indicator 2.3.3. Number of funded civic research projects

– Indicator 2.3.4. Number of promotions of newly developed and commercialized new products and services in ST parks

M. 2.4. – Development and adoption of a study on the potential scientific research organizations to contribute to the improvement of public policies and cultural development while respecting the specifics of the social sciences and humanities

Taking into account a number of challenges in the field of public policies and cultural development that the Republic of Serbia is facing in the XXI century, several strategic documents envisage that the scientific research and innovation system will contribute to their improvement, but the potential needed to face this challenge remains unknown, which refers to all areas of science, and especially to the role and development of social sciences and humanities in the Republic of Serbia. The field of social sciences and humanities, with all its characteristics, has the capacity to conduct research in the field of public policy, education, social and cultural innovations, human and minority rights, as well as research that leads to better understanding and addressing cultural, social and economic issues and challenges,

development and improvement of education and the education system, and the development of critical thinking and other standards of civilization in Serbian society. In order to put these potentials in the function of society, it is necessary to conduct a detailed and comprehensive analysis at the level of the entire scientific community, with special focus on social sciences and humanities.

- Implementing entity: MESTD

- Partner institutions in the implementation of activities: Association of Institutes of Serbia, Conference of Universities of Serbia (KONUS), Science Fund of the Republic of Serbia

- Indicator 2.4.1. A study is prepared on the potential of scientific research organizations to contribute to the improvement of public policies and cultural development while respecting the specifics of the social sciences and humanities

- Indicator 2.4.2. Study on the potential of scientific research organizations is adopted that will contribute to the improvement of public policies and cultural development with respect to the specifics of the social sciences and humanities

- Indicator 2.4.3. Adopted Program for the implementation of the Study on the potential of scientific research organizations to contribute to the improvement of public policies and cultural development with respect to the specifics of the social sciences and humanities

SO 3 – Nurturing the top quality of science and technological development and strengthening the competitiveness of the economy

The progress of the Republic of Serbia is not possible without constant access to new scientific knowledge. Significant contribution is provided by basic and applied research whose primary objective is the systematic search for new knowledge that solves new or existing scientific problems, to prove new ideas and develop new theories. New products, new industries, and new jobs imply the continuous expansion of our knowledge of natural and social processes, as well as the application of that knowledge for practical purposes. Similarly, both the defense and security of the state require new knowledge without which the development of new and the improvement of existing systems is not possible. The Republic of Serbia can acquire this new knowledge only if it nurtures top scientific research.

Providing all forms of support to talented and gifted students would form a new generation of researchers trained to develop new products and new technologies. Special incentive programs and scholarship programs for young and talented people for scientific research work co-finance the scientific research activities of young researchers, doctoral students and the best talented students in the final grades of secondary schools. The main goal of the program is to create conditions for the preservation and development of scientific research youth and to prevent the outflow of scientific personnel. In addition to scholarships for doctoral students and pupils, it also financially supports a series of activities related to their study and training: going to scientific gatherings in the country and abroad, participation in international scientific Olympics and knowledge competitions, study stays, financing the participation of scholarship students on the MESTD projects and other forms of training.

In order to achieve this goal based on previous results, initiated reforms and experiences of the countries of the region and Europe, it is necessary to strengthen (M. 3.1) the quality of basic research, as well as (M. 3.2) the quality of technological development.

- Implementing entity: MESTD

- Indicator 3.1. Total citations

- Indicator 3.2. Total number of scientific papers

- Indicator 3.3. Rank of the Republic of Serbia according to the Global Innovation Index

M. 3.1. – Support to increase the quality of basic research

Scientific excellence and relevance, as well as their evaluation, are the basic preconditions for the knowledge that exists and develops in universities and institutes to be internationally competitive and to create new scientific value. In the previous period, measures were successfully implemented, which in most scientific fields led to a significantly increased production of scientific papers. At the same time, the quality grew, which is primarily measured by the citation of published scientific papers. In order to achieve even better results and improve the scientific research staff, it is necessary to introduce a stimulating measure to support the quality of basic research.

The purpose of this measure is to further improve the quality of basic research, which is achieved through:

- (1) support for publication in scientific journals with a high impact factor and monographs from leading publishers, including open access journals;
- (2) support for researchers authors of highly cited papers (top 10% in the field);
- (3) support for scientists who have succeeded in the best international competitions (*ERC*); support to institutions with high international recognition and
- (4) support for the procurement of scientific research literature and access to electronic scientific databases and the issuance of scientific publications and the organization of scientific conferences;
- (5) support to Centers of Excellence.

Quantitative parameters of scientific excellence, such as citation and the H-index, will determine in a clearly measurable and transparent manner the degree of stimulation provided by this measure. Given that the publication of articles in top international journals with high impact factor values directly affects citations, as well as that publication in journals with low impact factor reduces the chances of scientific results being more clearly recognized, this measure provides a special set of activities and incentives for publication in such publications (1). Through the institutional model of financing scientific research, the Republic of Serbia will recognize the specific role of social sciences and humanities by placing their scientific results in the context of improving state decisions aimed at social challenges and preserving cultural, historical and national identity and national, European and world heritage.

In addition to evaluating individual results and high citations, this measure envisages stimulation of research at two levels: (2) researchers who continuously contribute to their field so that they are recognized in the top 10%, but also (3) through additional incentives to participate in prestigious international competitions, such as the competition of the European Research Council (*ERC*) which is an additional, international upgrade in the competitiveness provided by the programs of the Science Fund of the Republic of Serbia at the national level. Additional incentives are aimed at strengthening the research environment, primarily (4) strengthening institutions with the best results at the international level and (5) logistical support for the work of researchers.

Quantitative criteria, as well as specific incentives will be defined in more detail by the Rulebook on Institutional Financing.

– Implementing entity: MESTD

– Partner institutions in the implementation of activities: Science Fund of the Republic of Serbia, National Library of Serbia

– Indicator 3.1.1. Amendments and Supplements to the Law on the Science Fund of the Republic of Serbia

– Indicator 3.1.2. Number of published papers in journals with impact factor

- Indicator 3.1.3. Number of technical solutions implemented in the country and abroad
- Indicator 3.1.4. Number of papers published in high-ranking journals
- Indicator 3.1.5. Number of published monographs of the world's leading publishers
- Indicator 3.1.6. Number of researchers who are in the top 10% in the world in terms of the number of citations
- Indicator 3.1.7. Number of researchers who participated in scientific conferences and meetings of the working body of the scientific conference abroad

M. 3.2. – Support to the increased quality of technological development

Technological development is the basic link between fundamental knowledge and economic development. The success of a company depends on the ability and potential to develop its own technologies, products and services, which significantly increases the competitiveness of the domestic economy in the international framework. The Action Plan defines the activities that lead to raising the level of technological readiness from basic ideas to finished products and services. This is achieved through the support of SRO, startups and high-tech companies, as well as through stimulating measures of cooperation between the economy and science. The measure includes capacity building within the MSMEs sector, strengthening links between SROs and public enterprises and systems, as well as the economy as a whole. In highly developed economics, the value of intangible property often far exceeds the value of tangible property, thanks to intellectual property. The measure aims to increase the total value of business entities in the Republic of Serbia through monopoly positions that are achieved through the registration of inventions and the exploitation and trade of intellectual property.

Based on the analysis of the current situation, the need for strengthening the economy based on innovation has been identified, which supports the development of high-tech companies through the improvement of the administrative framework, strengthening the scientific research infrastructure and infrastructure to support innovation.

The current legal framework in the Republic of Serbia needs to be adjusted to the dynamic global changes within the innovation sector, which refers to the creation of a framework for new financial models, as well as to the adaptation of the existing system to new forms of infrastructure support. In addition to the adoption of a new legal framework, through the Innovation Fund, it is planned to develop new programs based on providing support to innovation and strengthening cooperation between science and economy.

The efficiency of technology transfer depends on the quality of scientific results and the accurate and timely selection of those results that have the potential to grow into technologies. One of the identified weaknesses was the lack of qualified staff to perform quality selection, intellectual property protection, communication with businesses and commercialization. In order for technology transfer to be successful, comprehensive and continuous training of scientific and research staff on the basic principles of this procedure is needed. On the other hand, direct communication with the economy requires the engagement of experts who understand the market needs and who are able to provide additional funding for the development and commercialization of technologies. The technology transfer process in accordance with the laws governing intellectual property is a challenge, so it is necessary to establish internal regulations and rulebooks.

The initial successes of the development of STP in the Republic of Serbia provide a realistic basis for continuing the development of this concept. At the time when the Strategy was drafted, four science and technology parks have been established and are operational, and further expansion of the STP network is expected, respecting the principle of regional development in accordance with the needs and

potentials. The capacities of the existing network meet the prescribed requirements, except for the STP Belgrade, which has filled its spatial resources and needs to be expanded.

- Implementing entity: MESTD
- Partner organizations in the implementation of activities: Innovation Fund, Intellectual Property Office of Serbia, science and technology parks, SRO
- Indicator 3.2.1. Number of joint science and companies' projects through the collaborative grant scheme of the Innovation Fund
- Indicator 3.2.2. Number of companies that commercialized new/improved products by companies supported through the Collaborative Grant Scheme of the Innovation Fund
- Indicator 3.2.3. Number of provided services of the SRO to companies through innovation vouchers
- Indicator 3.2.4. Number of filed patent applications
- Indicator 3.2.5. Adopted laws and bylaws regulating the innovation activity and the work of the Innovation Fund
- Indicator 3.2.6. Number of researchers trained in intellectual property and TT
- Indicator 3.2.7. Number of newly registered startups in STPs

SO 4 – Focusing research on social challenges and priorities

In parallel with the development of top science in the Republic of Serbia, in order to respond to the growing needs of society in the XXI century, it is necessary to focus research on the following:

- social challenges, such as:
 - health and standard of the population,
 - food and water,
 - security and defense,
 - energy,
 - environmental protection and climate change,
 - nurturing national identity,
 - improvement of state decision-making,
- priority technologies, such as:
 - ICT and artificial intelligence,
 - innovative industries and industry 4.0,
 - emerging technologies of strategic interest.

The mechanism by which this type of focus can be achieved in the scientific research and innovation system has already been established through the competitive component of financing the scientific and technological and innovation system, primarily through the programs of the Science Fund of the Republic of Serbia and the Innovation Fund that should respond to the priorities defined through this objective. By their nature, social challenges are unpredictable, which is why it is necessary to establish additional mechanisms that will enable their timely recognition and reaction of science. In order for the research to focus on social challenges and priorities, it is necessary (M 4.1) to establish a mechanism

for nominating social challenges and (M 4.2) to develop targeted support programs towards already identified priority technologies in other strategies.

– Implementing entity: MESTD

– Indicator 4.1. Number of announced public calls by targeted programs, according to identified social challenges as well as priorities of the Smart Specialization Strategy

M. 4.1. – Establishing a mechanism used to nominate social challenges as scientific research topics and formation of expertise for public administration

Social challenges, such as the COVID-19 epidemic, natural disasters and other problems are continuously emerging and being addressed. They can often be neither predicted nor planned, but it is necessary to ensure that science is able to propose solutions to overcome them in a timely manner. Therefore, it is necessary to establish the Council for Social Challenges as an operational body that adopts and periodically updates the list of current social challenges. The Council for Social Challenges would meet on a regular quarterly basis or more often as needed and consider proposals from authorized nominators, i.e. line ministries, local self-government units, SASA, universities and institutes of national importance, as well as other scientific research organizations relevant for the proposed topic. For any social challenge, the Council shall assess the population exposure, intensity and overall risk, as well as urgency of action. The final decision on measures to address social challenges is made by the Government. Funds needed for SRO and holder of innovation activities to solve social challenges are provided from the section of the MESTD, Science Fund of the Republic of Serbia, Innovation Fund, budget sections of line ministries and other available resources.

– Implementing entity: MESTD

– Partner institutions in the implementation of activities: Government, other line ministries, Science Fund of the Republic of Serbia, Innovation Fund

– Indicator 4.1.1. A mechanism has been established to identify social challenges

M. 4.2. – Implementation of targeted programs according to the Smart Specialization Strategy and other strategies

Priority technologies necessary for the development of the Republic of Serbia have been identified by the methodology of entrepreneurial discovery and measures for their development are given in the Smart Specialization Strategy 4S (“Official Gazette of the Republic of Serbia”, No. 21/20). In addition, additional technologies have been identified in other strategies of the Republic of Serbia (Strategy of Artificial Intelligence and others). The Strategy on Scientific and Technological Development of the Republic of Serbia, as an umbrella strategy responsible for issues of scientific and technological development, supports all identified priority technologies. The list of identified priority technologies is updated annually by the National Council for Science and Technological Development, and it is financed through the programs of the Science Fund of the Republic of Serbia and the Innovation Fund.

– Implementing entity: MESTD

– Partner institutions in the implementation of activities: Science Fund of the Republic of Serbia, Innovation Fund

– Indicator 4.2.1. Number of annual updates of the list of priority technologies

SO 5 – Strengthening international cooperation

Science in the Republic of Serbia is fully integrated into international trends. Serbia cooperates with international organizations such as those from the United Nations system, primarily with UNESCO.

After years of crisis, scientific research and innovation system was the first to become part of Europe in practice in the middle of the first decade of the XXI century, joining the European Research Area through the *FP6* and *FP7* programs, followed by Horizon 2020. These programs visibly strengthened domestic researchers and institutions by encouraging them to compete with partners from Europe, while providing significant research funding.

- Implementing entity: MESTD

- Indicator 5.1. Degree of international links in relation to the base year

M. 5.1. – Improving participation in European science and innovation programs

Given that the level of competitiveness at the international level is continuously growing so that many European countries provide support to their researchers to present or express themselves and compete at the global level through various programs, it is necessary to provide the same support to domestic researchers.

This will be achieved through ongoing support to the academic and business sector in applying for Horizon Europe projects (5.1.3). It is also necessary to provide incentives for projects that have achieved excellent marks in the calls of the European Research Council and other calls of the current European Framework Program for Research and Innovation, but have not received funding from the European Commission.

In addition, the establishment of a support program for young researchers to participate in the European Research Council (*ERC*), as well as the establishment of cooperation with the European Institute of Innovation and Technology (*EIT*), will significantly improve participation in the Horizon Europe program.

In order to better coordinate and implement policies in the field of international cooperation and raise the level of participation, an advisory body – Committee for International Cooperation – will be established. The Committee will include representatives of the Republic of Serbia in the program committees of the Horizon Europe program, as well as other adequate members. In order to provide continuous support to researchers, a permanent representative will be appointed for science and innovation programs in the European Union.

- Implementing entity: MESTD

- Partner institutions in the implementation of activities: Ministry of Finance, national focal points, Ministry of Economy, Center for the promotion of science (CPN), SRO, Serbian Chamber of Commerce

- Indicator 5.1.1. Realized national contribution in the joint budget of the EU program for science and research Horizon Europe - HEU

- Indicator 5.1.2. Total number of contracted Horizon Europe projects

- Indicator 5.1.3. Total number of organizations from the Republic of Serbia that participate in the Horizon Europe program

- Indicator 5.1.4. Percentage of participation of our researchers in the current COST actions

- Indicator 5.1.5. Number of approved EUREKA projects in which researchers from the Republic of Serbia participate

- Indicator 5.1.6. Board of International Cooperation Groups established

M. 5.2. – Strengthening strategic bilateral and regional cooperation within European macro-regions and the Western Balkans region

In addition to the framework programs of the European Commission, the Republic of Serbia also participates in numerous multilateral and regional initiatives and organizations (EUREKA, COST, cooperation in the Danube region, the Central European Initiative and others). At the same time, the Republic of Serbia has signed a large number of agreements on bilateral cooperation with many countries.

It is necessary to activate bilateral scientific and technological cooperation with leading countries in the field of science, technology and innovation. Active participation in activities related to the implementation of the EU Strategy for the Danube Region should be continued in the area of joint programming and better combination of existing funds and initiation of new cooperation mechanisms, mobility of researchers, better use of existing research infrastructures, cooperation in implementing / realizing the Smart Specialization Strategy, etc.

It is also very important to establish programs and mechanisms for cooperation within the Berlin Process: to establish research foundations for the Western Balkans, a multi-annual action plan for the Regional Economic Area in the Western Balkans (*REA*), Regional Cooperation Council (*RCC*), with international scientific research organizations in Trieste, within the Adriatic – Ionian region, the Black Sea region, with the Western Balkans Research and Innovation Center and *EDIF/ENIF*.

- Implementing entity: MESTD

- Partner institutions for the implementation of activities: European Union, SRO

- Indicator 5.2.1. Number of initiated bilateral, regional and multilateral cooperation programs annually

- Indicator 5.2.2. Number of approved projects in which institutions from the Republic of Serbia participate

M. 5.3. – Providing access to international research infrastructure

In accordance with strategic research directions, membership in international research organizations CERN and JINR Dubna, as well as encouraging results so far in *CERIC*, *CESSDA*, *ESS* and *DARIAH* research infrastructures, the work of the Republic of Serbia on further involvement in European organizations and consortia will be intensified. This measure will enable the accession of the Republic of Serbia to the European Consortium for Research Infrastructure, as well as ensuring the use of Serbian infrastructure by European researchers. The measure also envisages the inclusion of the Republic of Serbia in open calls for research infrastructures of the Joint Research Center (JRC).

- Implementing entity: MESTD

- Partner institutions in the implementation of activities: SRO

- Indicator 5.3.1. Realized national contribution for providing access to international research infrastructure

- Indicator 5.3.2. Number of SRO from the Republic of Serbia that use international research infrastructures.

EFFECTS ANALYSIS

Effects of measures under the Specific Objective 1

The objective of the measures within Specific Objective 1 is the further development of the Republic of Serbia according to the model of the most successful countries. The share of research and development in the total BDP of developed countries is high. With this in mind, ambitious countries are constantly increasing their investment in science (South Korea 4,3%, Japan 3,4%, Finland 3,2%, Switzerland 3,2%, Austria 3,1%, Germany 2,9%, USA 2,7%, Slovenia 2,4%, France 2,3%). This creates key preconditions for the development of a competitive economy, which, together with the return mechanisms of investing

in research and development again, creates sustainable long-term growth. Having in mind the understanding of these processes, but also the inherent conditions in the Republic of Serbia, in the mentioned strategic period, the increased allocations in science and technological development are expected from the current 0.92% to 1.4% in 2025. Such an increase in investment can help increase the contribution of research and development to GDP, which is the basis for further accelerated development of the Serbian economy, and its increased competitiveness. Indicators of success in technological development, i.e. the composite index of the European Innovation Monitor, also show this. Although still relatively low, this index recorded a growth of 50% in the period from 2012 to 2019.

The set of measures covered by this specific objective will lead to phased growth, with the expected effect of reducing this gap by 2025, through affirmative measures for the inclusion of young researchers in the system of science and technological development, measures for integration of the Serbian scientific diaspora, measures aimed at the integration of researchers from the region, and measures to strengthen international cooperation.

In order to achieve the effect of growth of the number of researchers in the system, strong institutions are needed, with a top scientific research infrastructure and recognition and the regional, European and global level. The existing network of institutions has been expanded with the establishment of new institutes in Novi Sad and Kragujevac, and science and technology parks in Novi Sad, Nis and Cacak. Through measures related to the reform of the network of institutes, the redefining of roles of the existing institutes is expected as well as their substantial strengthening. Through planned investments in the procurement of new equipment, according to the Research Infrastructure Roadmap, scientists will have systematic support for their research. Special programs of the Science Fund of the Republic of Serbia will be implemented for this purpose, which would enable institutions to equip laboratories in accordance with the global level equipment. One of the effects of these measures is the increased number of international projects in which institutions from the Republic of Serbia participate.

Effects of measures under Specific Objective 2

Measures under this objective create preconditions for further sustainable progress of the scientific research and innovation system by increasing the efficiency and coherence of the use of its resources. On one hand, the success of these measures is based on providing public support, communication with citizens and strengthening cooperation with the economy, but above all on direct cooperation with SRO, through a series of defined steps, so that the process would not be stopped during the transformation process. On the other hand, the effect of the measures will be visible through measurable indicators, considering that, in its essence, these measures establish the measurability of the quality of the entire scientific research and innovation system. The measures will start through dynamic processes of nurturing scientific quality, growth in the number of researchers, replacement of staff leaving the system, strengthening and expansion of competencies, in order to achieve a long-term vision of SRO growth. The first measure will streamline the current work of SROs, as key institutions in the system – after the adoption of key bylaws and regulations, new mechanisms will be implemented to control and monitor the work of SROs, which will harmonize and directly link the results of SROs with their funding. At the same time, the second measure within this objective, through the processes of self-evaluation and evaluation, will accelerate and direct reforms within the SROs themselves, which will provide greater capacity of institutions and their better response to the incentives provided by the first measure. The third measure will provide a greater impact of science on the economy and society as a whole, by increasing the availability of achieved scientific research results and developed technologies to stakeholders. Strengthening, financial support and the establishment of new channels of communication between society and scientific research and innovation system is a key pillar in the realization of not only this objective, but of the Strategy as a whole.

Effects of measures under Specific Objective 3

Measures within this specific objective will provide better results and improvement of scientific research staff, which will increase the quality of basic research in the strategic period. They envisage a stimulating measure to support the quality of basic research and will lead to an increase in papers in high-impact scientific journals and monographs of the world's leading publishers, to an increase in the number of highly cited papers (top 10% in the field), up to the strengthening of institutions with high international recognition, to increase the availability of scientific research literature and access to electronic scientific databases, but also to increase participation in the best international competitions (ERC), along with measures from Specific Objective 5. Namely, these measures will improve the system of evaluation of individual results and high citations, but they will also introduce two types of stimulation: for researchers who are recognized in the group of the top 10% and researchers who participate in prestigious international competitions.

In addition to strengthening basic research, the focus of these measures is to strengthen the quality of technological development, which includes raising the capacities of SRO, R&D institutes, science and technology parks, organizations registered in the register of innovation, as well as the capacities of the Innovation Fund, within the MSMEs sector, strengthening the links between SRO and private companies and the system, as well as the economy as a whole. Improving the legal framework in this area will create preconditions for further development of financial support mechanisms. The continuous application of mechanisms for strengthening the innovation potential of the economy and science encourages the development of products and technologies of high added value, which will be globally recognized. The implementation of these measures will contribute to the improvement of the competitive position of the Republic of Serbia on the European market.

Specific measures and activities should recognize scientific research results that have the potential for application and commercialization. In order to achieve this, it is necessary to train researchers and entrepreneurs in the field of technology transfer and intellectual property protection. At the SRO level, it would be necessary to form organizational units that deal with technology transfer, innovation and commercialization. As a consequence of a systematic institutional approach, in addition to the development of technical and technological innovations, the emergence of organizational and business innovations can be expected. Based on the results of the STP Belgrade, the Republic of Serbia is unique in the broader region with its expansion of the network of science and technology parks in different regions (Novi Sad, Nis, Cacak, Kragujevac). The goal of these parks is to place technologies based on innovation which generate high added value on the regional and global market, thus directly stimulating exports.

Using the example of the STP Belgrade in 2019 when the companies, tenants of the park, achieved total revenues of EUR 28 million, and exports of EUR 16 million, we can project a drastic growth in exports thanks to the expansion of the network of parks. Having in mind the regionally available resources and potentials, and the growth of the number of startup companies, the projected export of all parks at the end of the strategic cycle can exceed EUR 50 million.

Effects of measures under Specific Objective 4

The most significant effect of the measures envisaged by this objective will be reflected in the focus of research efforts on the final set of social challenges and priority technologies, so that the Republic of Serbia will be able to respond to the growing needs of society in the 21st century. In order to use the power of science to eliminate the challenges faced by the citizens of the Republic of Serbia, without slowing down or stopping the development of basic research, the focus was accompanied by a simultaneous increase in capacity and efficiency of SRO, planned under Specific Objectives 1 and 2, as well as empowering the channel of communication between science and the society. The measures will lead to the establishment of a new, flexible model of nominating social challenges as scientific research topics, which will create a dynamic, adaptive system in which strong science will serve the well-being of all citizens of the Republic of Serbia.

Effects of measures under Specific Objective 5

The measures under this objective will provide further improvement of participation in the European Framework Program for Science and Innovation, but also strengthening of bilateral and international cooperation. This will be achieved through constant support to the scientific and innovation sector, but also to the economy, through applications for the Horizon Europe projects. As the level of competitiveness at the international level continues to grow, and many European countries provide support to their researchers to present or express themselves and compete globally through various programs, the same support will increase the chances for domestic researchers. The formation of the Committee for International Cooperation will provide a dynamic and efficient solution to challenges, a larger number of contracted projects for organizations from the Republic of Serbia that participate in European Framework Programmes, as well as the total contracted budget.

RISK ASSESSMENT

Table No. 3v: Overview of the Risk assessment by specific objectives of the Strategy

Specific objective	Activities/directions of policy action	Assumptions	Risk description	Risk solution/mitigation measures
SO 1 – Provide necessary conditions for dynamic development of science, technological development and innovation	Involvement of young researchers in scientific research work of doctoral academic students, as well as stimulation of researchers returning from abroad to engage in scientific research work in the country	Interest among young people to realize their doctoral studies through programs and projects in the country	Insufficient number of young people who continue their education at faculties, with the aim of engaging in scientific research	Continuous promotion of science, by all institutions and coordination of regional research centers that aim to increase the number of students interested in science, as well as the activities of specialized organizations (RS Petnica)
	Stimulating the economy to invest in science and development	Possibilities of state-level allocations for science and development and allocations of the economy for development in the economy	Liquid opportunities. Low level of activity with the economy	Creating assumptions for budget investments to be accompanied by investments from the economy, and <i>vice versa</i>
SO 2 – Increasing the	Digitization process	Establishing an IT basis in	Insufficient networking at all	Stronger connection of all

efficiency of using the resources of scientific research system		the form of a unified national information system of scientific research: eScience	levels from individual institutions to relevant bodies	relevant factors in the implementation of activities, starting from state institutions to scientific research organizations
	Reforming the network of institutes and establishing a mechanism for monitoring the implementation of scientific research and reporting	Changing the current practice in the evaluation of scientific research work of the institute through the principle of self-evaluation and external evaluation	Readiness and ability of the institutes for continuous implementation of self-evaluation and external evaluation	An evaluation support mechanism has been established within the components defined through the Serbia Accelerating Innovation and Entrepreneurship Project)
SO 3 – Nurturing the top quality of science and technological development and strengthening the competitiveness of the economy	Increase in the total citations and total number of scientific papers	Support for publication in scientific journals with a high impact factor and monographs of leading publishers	Insufficient number of highly cited works of researchers	Adopted act that will contribute to the support of researchers who contribute to their scientific field as well as best-performing institutions
	Support for knowledge transfer to the economy	Expansion of the existing network of science and technology parks	Small number of newly established technology companies are members of science and technology parks	Targeted conditions of public calls. Providing support by science and technology parks to the work of companies / members through professional training

	Development of high-impact innovations based on new knowledge	Interest in applying innovations based on science and technological development	Insufficient commercialization of new knowledge	Incentive to protect intellectual property, licensing and applications
SO 4 – Focusing research on social challenges and priorities	Announcing public calls for targeted programs, according to identified social challenges	A Council for Social Challenges established, which will timely recognize them and recommend solutions based on scientific and technological knowledge	Emergence of new social challenges of great impact (like COVID-19). Lack of adequate scientific research infrastructure	Establishing mechanisms and procedures to respond to social challenges. Systematic and planned investment in scientific research infrastructure.
SO 5 – Strengthening international cooperation	Improving participation in European science and innovation programs	Researchers' interest in participation in the European Research Council (ERC) and other European science and innovation programs	Insufficient motivation of researchers, especially young researchers, to participate in the European Research Council (ERC) and other European science and innovation programs	The establishment of a support program for young researchers to participate in the European Research Council (ERC), as well as the establishment of cooperation with the European Institute of Innovation and Technology (EIT), will significantly improve participation in the Horizon Europe program
		Leading countries in the field of science, technology	Insufficient visibility of research capacities	Intensified international activity of MESTD on promoting

		and innovation as well as countries in the region recognize researchers from the Republic of Serbia as potential cooperation partners in the field of science	of the Republic of Serbia	research capacities of the Republic of Serbia in leading countries in the field of science, technology and innovation as well as with countries in the region
		Researchers' interest in participating in the European Research Council (ERC) program and other European science and innovation programs		Greater participation of researchers from the Republic of Serbia in international projects and networking with researchers in leading countries in the field of science, technology and innovation as well as in countries in the region

MECHANISM FOR IMPLEMENTATION AND MONITORING OF IMPLEMENTATION

The Ministry of Education, Science and Technological Development is the competent body for the coordination and implementation of the Strategy. The mechanisms for the implementation of the Strategy are based on measurable monitoring of its effects based on the parameters provided by the Strategy itself. For the validity period of the Strategy, the Ministry of Education, Science and Technological Development prepares two action plans and sends them to the Government for consideration and adoption. These Action plans, in accordance with the objectives of the Strategy, shall define measures, activities, responsible institutions and partners, results' indicators, deadlines and resources and their sources. To achieve the desired goals, the Strategy defines measures that by their nature can be divided into regulatory, incentives, informational and educational, institutional management and organization measures, and measures that provide the possibility of providing goods and services by the holders of specific activities. For the purpose of monitoring each specific objective in a comprehensive way, it is possible to combine different types of measures. The achievement of results at the level of each measure from the Strategy is measures within the prescribed deadlines and it is expressed in a quantitative manner, using indicators. The Strategy envisages a total of 65 indicators, which in a measurable way express the effects in the implementation of specific activities. The overall

evaluation of the Strategy is done by analyzing whether, and to what extent, the achieved effects are in line with the indicators of effects at the level of the general objective, outcome indicators at the level of specific objectives and result indicators at the level of individual measures. The progress report on the implementation of the Action Plan is prepared by the Ministry of Education, Science and Technological Development, based on reports submitted by all competent bodies and institutions for implementation of measures through the Single Information System for Planning, Implementation Monitoring, Policy Coordination and Reporting (JIS). The report on the results in achieving the established objectives of the Strategy will be prepared in accordance with Article 43 paragraph 1 of the Law on the Planning System, and the final report will be submitted to the Government for adoption within six months after the expiration of the Strategy.

Financial Resources

Financial resources for the implementation of the Strategy and the Action Plan during 2021 are provided in the Budget of the Republic of Serbia. For the following years, the funds will be provided within the limits set by the Ministry of Finance in the section of the Ministry of Education, Science and Technological Development, in accordance with balance possibilities. It is planned to provide funds from donations, project loans, international assistance, as well as from other sources in order to implement the above mentioned act.

In addition to the budget approved funds, resources are planned under the Loan Agreement (Serbia Accelerating Innovation and Entrepreneurship Project) signed between the Republic of Serbia and the International Bank for Reconstruction and Development (Number IBRD 90290YF), in accordance with the Law on Ratification of the Loan Agreement ("Official Gazette of the Republic of Serbia – International Agreements", No. 3/20), and other sources. In addition, the European Commission, considering the World Bank to be a reliable partner, has decided to implement its donor funds from IPA 2019 in the field of Competitiveness, through the World Bank within the components defined by the SAIGE Project. The total estimated funds for 2021 are RSD 24 billion.

Based on previous experiences in the participation and implementation of international projects, the Ministry of Education, Science and Technological Development estimated that after the end of the strategic cycle, the Republic of Serbia will have a reduced need for borrowing and a positive impact on further scientific and technological development will be achieved. The experience is based on the following projects:

- Serbia Research, Innovation and Technology Transfer Project, 2014–2019,**
- Serbia Competitiveness and Jobs Project, 2015–2021,**
- Serbia Accelerating Innovation and Entrepreneurship Project, 2020–2024.**

CONSULTATIONS WITH STAKEHOLDERS

The cooperation and consultation processes were conducted in accordance with Article 34 of the Law on the Planning System of the Republic of Serbia. This article stipulates that during the preparation of public policy documents it would be necessary to ensure the participation of stakeholders and target groups, as well as representatives of state bodies and other participants in the planning system that implement or in relation to which the policy is implemented.

In accordance with that, the preparation of the Strategy was preceded by consultative cooperation with representatives of the scientific community, SRO, companies and other bodies and organizations. The

drafting of the Strategy was coordinated by the Ministry of Education, Science and Technological Development, and its drafting and consultations were attended by members of the Working Groups, which consisted of representatives of the Serbian Academy of Sciences and Arts, the National Council for Scientific and Technological Development, the Association of Serbian Institutes, the Conference of Serbian Universities, the Science Fund of the Republic of Serbia, the Innovation Fund, the Center for the Promotion of Science, the Science and Technology Park Belgrade and other scientists and organizations.

The Strategy was developed based on a broader consultation process with representatives of all stakeholders. During the consultation process, which took place from February 2020 until the end of the public debate on 12th January 2021, several direct and online meetings were held with relevant structures from the scope covered by this Strategy. During their work, the members of the Working Group consulted other bodies in accordance with the delegated activities and tasks from the Decision on the establishment of the Working Group. On several occasions, members of the Working Group gave proposals and suggestions on the working draft of the document. The proposals of the members were then processed, grouped and included in a broader scope in the text of the Strategy and Action Plan.

The public hearing regarding the Draft Strategy on Scientific and Technological Development of the Republic of Serbia for the period from 2021 to 2025 “The Power of Knowledge” took place from 24th December 2020 to 12th January 2021. Due to the general epidemiological situation in the country, the public debate was held in accordance with the adopted Public Hearing Program, in the form of submission of written proposals, suggestions and remarks. During the public hearing, 73 letters with proposals and suggestions were received in writing, via the indicated e-mail address, of which all suggestions and remarks that contributed to the qualitative editing of the text contained specific proposals, i.e. proposals that may be contained in this type of planning document, were accepted and included in the text of the Strategy and the Action Plan.

ACTION PLAN

Pursuant to Article 18 of the Law on the Planning System (“Official Gazette of the Republic of Serbia”, No. 30/18), with the adoption of this Strategy, an action plan is adopted as well. The Action Plan is adopted for a period of three years and defines specific measures and activities undertaken to ensure the conditions for the implementation of the Strategy objectives, highlighting the holders and partners for the implementation of these measures and activities and defining indicators, deadlines and means for their implementation.

The Action Plan for the implementation of the Strategy for the first three-year period (2021–2023) forms an integral part of this Strategy.

FINAL PROVISIONS

This Strategy shall be published on the website of the Government, the website of the Ministry of Education, Science and Technological Development and the e-Government Portal, within seven working days from the day of its adoption.

The Strategy shall be published in the “Official Gazette of the Republic of Serbia”.

05 number 660-940/2021
In Belgrade, 4th February, 2021
Government
Prime Minister
Ana Brnabic

Action Plan of the Strategy on Scientific and Technological Development for the period 2021 to 2023	
PP Document:	Strategy on Scientific and Technological Development of the Republic of Serbia for the period 2021 to 2025
Action Plan:	Action Plan for the implementation of the Strategy on Scientific and Technological Development of the Republic of Serbia for the period from 2021 to 2023
Coordination and reporting:	Ministry of Education, Science and Technological Development

General objective: Scientific and technological and innovation system contributes to accelerated development of the Republic of Serbia through improvement of the quality and efficiency of science, technological development and innovation and further integration into the European Research Area, which helps contribute to the achievement of standards of the developed economies.						
Implementing entity: Ministry of Education, Science and Technological Development						
Indicator(s) at the level of the general objective	Unit measure	Source of verification	Baseline	Base year	Target value in the last year of the AP	Last year of the AP
Transition from a developing economy to a developed economy	NO/YES	World Economic Situation and Prospects (WESP 2019)	NO	2019	YES	2023

Specific objective 1: Provide necessary conditions for dynamic development of science, technological development and innovation							
Institution responsible for implementation monitoring and control: Ministry of Education, Science and Technological Development							
Indicator(s) at the level of specific objective	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
Total allocation for science and technological development	% GDP	SORS, Eurostat	0,92	2018	1	1,1	1,2

Total number of researchers	Number	MESTD	12,500	2020	13,500	14,500	15,500
Total funds for scientific research infrastructure, including capital projects and equipment, in relation to the base year	%	MESTD	100	2020	117	114	147

Measure 1.1.: Creating conditions to achieve the targeted level of budget financing							
Implementing entity: Ministry of Education, Science and Technological Development							
Implementation period: from 2021 to 2023				Type of measure: Incentive			
Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
State allocations for science and technological development	% GDP	SORS, Eurostat	0,37	2018	0,44	0,48	0,52
Number of achieved tax reliefs for business entities based on procurement of the R&D service from a SRO	Number	SRO, Chamber of Commerce, MESTD	0	2020	3	5	10

Source of funding of the measure	Link to the program budget	Total estimated financial resources in 000 RSD		
		In 2021	In 2022	In 2023
Budget revenues				
Financial assistance of the EU				

Activity name	Implementing entity	Implementing partner institutions	Deadline for completion of the activity	Source of funding	Link to the program budget	Total estimated financial resources by sources in 000 RSD		
						2021	2022	2023
1.1.1. Preparing annual reports on investment needs in science and technological development	MESTD	Science Fund of the RS, Innovation Fund, Ministry of Economy	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0007 (regular appropriations)	-	-	-
1.1.2. Establishing a coordination body and coordination with the Ministry of Finance and other line ministries in the process of preparing the budget for science and technological development	MESTD	MF, CoC, other line ministries	3 rd quarter of each year	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0007 (regular appropriations)	-	-	-

1.1.3. Launching an initiative for the adoption of incentive measures for the procurement of R&D services from SROs by the economy through tax relief	MESTD	MF, Science Fund of the Republic of Serbia, Innovation Fund, other line ministries	4 th quarter of 2021	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0007 (regular appropriations)			
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Measure 1.2: HR Development							
Implementing entity: Ministry of Education, Science and Technological Development							
Implementation period: from 2021 to 2023				Type of measure: Incentive			
Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
Young researchers newly involved in scientific research	Number	MESTD	500	2020	750	750	750
Returnees from abroad involved in scientific research	Number	MESTD	25	2020	50	50	50
Researchers foreign nationals	Number	MESTD	5	2020	15	15	15
Researchers from diaspora involved in scientific research in the Republic of Serbia	Number	MESTD	100	2020	250	250	250
Researchers from the region involved in scientific research activities in the Republic of Serbia	Number	MESTD	50	2020	150	150	150

Sources of funding of the measure	Link to the program budget	Total estimated financial resources in 000 RSD		
		In 2021	In 2022	In 2023
Budget revenues	PA 0001	301.400	301.400	301.400
Financial assistance of the EU		-	-	-

Activity name	Implementing entity	Implementing partner institutions	Deadline for completion of the activity	Source of funding	Link to the program budget	Total estimated financial resources by sources in 000 RSD		
						2021	2022	2023
1.2.1. Human resources development through targeted MESTD programs for the inclusion of researchers in scientific research	MESTD		4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0001	452.000	497.200	546.920
1.2.2. Human resources development through programs for the implementation of existing and development of new targeted programs of the Science Fund of the Republic of Serbia for the inclusion of researchers in scientific research ⁴⁷	Science Fund	MESTD	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0013	-	-	-

⁴⁷ Funds for the implementation of activity 1.2.2 implemented by the Science Fund of the Republic of Serbia, are provided in accordance with the Law on Budget of the Republic of Serbia for 2021 ("Official Gazette of the Republic of Serbia", No. 149/20) within the Program Activity (PA) 0013 "Support to the work of the Science Fund of the Republic of Serbia". In addition to the funds approved from the budget, funds are planned under the Loan Agreement (Serbia Accelerating Innovation and Entrepreneurship Project), signed

between the Republic of Serbia and the International Bank for Reconstruction and Development (IBRD No. 30290FY), in accordance with the Law on Ratification of the Loan Agreement (“Official Gazette of the RoS – International Agreements”, No. 3/20). In addition, the European Commission, which considers the World Bank to be a reliable partner, has decided to implement its donor funds from IPA 2019 planned for the area of Competitiveness, through the World Bank within the components defined by the SAIGE Project.

Measure 1.3: Strengthening scientific and research infrastructure							
Implementing entity: Ministry of Education, Science and Technological Development							
Implementation period: from 2021 to 2023				Type of measure: Provision of goods and services			
Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
Updated Research Infrastructure Roadmap	NO/YES	MESTD	NO	2020	NO	YES	YES
Total value of capital projects (annually)	Amount of resources (000)	Budget of the Republic of Serbia	3.487.698	2020	3.286.000	3.000.000	4.000.000
Total value of procured equipment (annually)	Amount of resources (000)	Report on the work of the Science Fund of the Republic of Serbia	-	2020	782.000	955.800	1.115.100

Source of funding of the measure		Link to the program budget	Total estimated financial resources in 000 RSD		
			In 2021	In 2022	In 2023
Budget revenues	PJ 4002, PJ 5002, PA 0001 and PJ 4009	3.347.000		3.021.000	4.021.000
Financial assistance of the EU					

Activity name	Implementing entity	Implementing partner institutions	Deadline for completion of the activity	Source of funding	Link to the program budget	Total estimated financial resources by sources in 000 RSD		
						2021	2022	2023
1.3.1. Updating the Research Infrastructure Roadmap	MESTD	World Bank	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0007 (regular allocations)	-	-	-
1.3.2. Procurement of scientific research equipment through the programs of the Science Fund of the Republic of Serbia and/or the MESTD programs ⁴⁸	Science Fund of the Republic of Serbia	MESTD	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0013	-	-	-

⁴⁸ Funds for the implementation of activity 1.3.2. implemented by the Science Fund of the Republic of Serbia, are provided in accordance with the Law on Budget of the Republic of Serbia for 2021 ("Official Gazette of the Republic of Serbia", No. 149/20) within the program activity 0013 "Support to the work of the Science Fund of the Republic of Serbia". In addition to the funds approved from the budget, funds are also planned under the Loan Agreement (Serbia Accelerating Innovation and Entrepreneurship Project), signed between the Republic of Serbia and the International Bank for Reconstruction and Development (No. IBRD 30290FY), in accordance with the Law on Ratification of the Loan Agreement ("Official Gazette of the Republic of Serbia – International Agreements", No. 3/20). In addition, the European Commission, which considers the World Bank to be a reliable partner, has decided to implement its donor funds from IPA 2019 planned for the area of Competitiveness, through the World Bank within the components defined by the SAIGE Project.

1.3.3. Implementation of infrastructure capital projects ⁴⁹	MESTD	PIMO, PIU	4 th quarter of 2023	01 General revenues and receipts from the Budget and other sources	0201 Development of science and technology / PJ 4002 and PJ 5002	3.286.000	3.000.000	4.000.000
1.3.4. Support to scientific research work of centers of excellence	MESTD		4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0001	21.000	21.000	21.000
1.3.5. Establishment of new institutions (Institute of Artificial Intelligence)	MESTD	Government of Serbia	1 st quarter of 2021	01 General revenues and receipts from the Budget	0201 Development of science and technology / PJ 4009	40.000	-	-

⁴⁹ Funds for the financing of the activity 1.3.3. are provided within the implementation of the project Research and Development in the Public Sector, in accordance with the Financial Agreement FIN.25.497 (RS) between the Republic of Serbia and the European Investment Bank (Research and Development in the Public Sector), concluded on 4th March 2010 in Belgrade; Framework Loan Agreement F/P 1711 between the Republic of Serbia and the Council of Europe Development Bank, concluded on 15th October 2010 in Belgrade, as well as the Framework Loan Agreement F/P 1739 between the Republic of Serbia and the Council of Europe Development Bank, concluded on 4th November 2011.

Measure 1.4: Development of digital infrastructure.							
Implementing entity: Ministry of Education, Science and Technological Development							
Implementation period: from 2021 to 2023				Type of measure: Informative-educational			
Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
Established single national eScience system, which includes electronic databases and registers, including the Register of Scientific Research Organizations, the Register of Researchers, Register of Capital Equipment	NO/YES	Report on the work of the Office for IT and eGovernance	NO	2020	NO	YES	YES
Increased number of users of publicly available dynamic internet presentations with profiles of researchers and scientific research organizations	%	Report on the work of SRO	100%	2020	110%	120%	130%

Source of funding of the measure	Link to the program budget	Total estimated financial resources in 000 RSD		
		In 2021	In 2022	In 2023
Budget revenues		-	-	-
Financial assistance from the EU		-	-	-

Activity name	Implementing entity	Implementing partner institutions	Deadline for completion of the activity	Source of funding	Link to the program budget	Total estimated financial resources by sources in 000 RSD		
						2021	2022	2023
1.4.1. Establishment of a single national eScience system	MESTD	Office for IT and eGovernance, Science Fund of the RoS, SRO	4 th quarter of 2022	Resources are not provided	-	-	-	-
1.4.2. Maintenance of electronic databases kept as registers (Register of researchers and Register of scientific research organizations)	MESTD	Office for IT and eGovernance, Science Fund of the RoS, SRO	4 th quarter of 2022	Resources are not provided	-	-	-	-
1.4.3. Digitization of the procedure for acquiring a scientific or research title, the procedure for accreditation of scientific research organizations and the procedure for applying for project funding	MESTD	Office for IT and eGovernance, Science Fund of the RoS, SRO	1 st quarter of 2022	Resources are not provided	-	-	-	-
1.4.4. Maintaining internet presentations with profiles of researchers and scientific research organizations	MESTD	Office for IT and eGovernance, Science Fund of the RoS, SRO	4 th quarter of 2022	Resources are not provided	-	-	-	-

Specific objective 2: Increasing the efficiency in the use of scientific research system.

Institution responsible for monitoring and control of implementation: Ministry of Education, Science and Technological Development							
Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
Established mechanism for monitoring of the implementation of scientific research work at the SRO level	NO/YES		NO	2020	NO	NO	YES
Number of reformed instituted (per year)	Number	MESTD	0	2020	0	7	7
Number of users of popular science programs (cumulative)	Number	CPS	15,500	2020	16,500	18,000	20,000

Measure 2.1: Regulation, rationalization and monitoring the implementation of the overall scientific research activity							
Implementing entity: Ministry of Education, Science and Technological Development							
Implementation period: from 2021 to 2023				Type of measure: Institutional managerial-organizational			
Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
Rulebook on institutional financing of SRO adopted	NO/YES	MESTD	NO	2020	YES		
Reports on the quality of scientific research implementation of the SRO activities	Number	MESTD	157	2020.	158	159	160
Adopted and agreed norms and quality standards at the SRO level	NO/YES	MESTD	NO	2020.	YES		
Prescribed a single set of data that the MESTD requires from SRO on an annual basis	NO/YES	MESTD	NO	2020	YES		

Source of funding of the measure	Link to the program budget	Total estimated financial resources in 000 RSD		
		In 2021	In 2022	In 2023
Budget revenues		-	-	-
Financial assistance from the EU		-	-	-

Activity name	Implementing entity	Implementing partner institutions	Deadline for completion of the activity	Source of funding	Link to the program budget	Total estimated financial resources by sources in 000 RSD		
						2021	2022	2023
2.1.1. Adoption of the Rulebook on Institutional Financing	MESTD	SRO, IP Institute	1 st quarter of 2021	01 General revenues and receipts from the Budget	0201 Development of science and technology/ PA 0007 (regular allocations)	-	-	-
2.1.2. Quality control of the realization of scientific research activities of SRO	MESTD		4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology/ PA 0007 (regular allocations)	-	-	-
2.1.3. Updating the norms and standards of quality of work of SRO	MESTD		4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology/ PA 0007 (regular allocations)	-	-	-

Measure 2.2: Reform of the network of institutes							
Implementing entity: Ministry of Education, Science and Technological Development							
Implementation period: 2021 to 2023				Type of measure: Institutional managerial-organizational			
Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
Adopted methodology of self-evaluation and external evaluation	NO/YES	MESTD	NO	2020	YES		
Number of conducted self-evaluations in SRO (annually)	Number	MESTD	54	2020	65	65	65
Number of implemented external evaluations of SRO per year	Number	MESTD and International financial institutions	0	2020	7	17	17
Number of reformed institutes	Number	MESTD and International financial institutions	0	2020	0	7	7

Source of funding of the measure	Link to the program budget	Total estimated financial resources in 000 RSD		
		In 2021	In 2022	In 2023
Budge revenues		-	-	-
Financial assistance from the EU		-	-	-

Activity name	Implementing entity	Implementing partner institutions	Deadline for completion of the activity	Source of funding	Link to the program budget	Total estimated financial resources by sources in 000 RSD		
						2021	2022	2023
2.2.1. Presenting the administrative structures of the institutes with self-evaluation procedures prescribed by the Rulebook	MESTD	CPS	3 rd quarter of 2021	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0007 (regular allocations)	-	-	-
2.2.2. Methodology development and external evaluation of selected institutes	MESTD	World Bank	4 th quarter of 2021	Loan	-	-	-	-
2.2.3. Implementation of the study on the reform of	MESTD	World Bank	4 th quarter of 2021	Loan	-	-	-	-

selected institutes ⁵⁰								
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⁵⁰ Funds for the implementation of the activities 2.2.2. and 2.2.3. are planned from the approved resources based on the Loan Agreement (Serbia Accelerating Innovation and Entrepreneurship Project), signed between the Republic of Serbia and the International Bank for Reconstruction and Development, No. IBRD 90290YF, in accordance with the Law on Ratification of the Loan Agreement ("Official Gazette of the Republic of Serbia – International Agreements", No. 3/20). In addition, the European Commission, which considers the World Bank to be a reliable partner, has decided to implement its donor funds from IPA 2019 planned for the area of Competitiveness, through the World Bank within the components defined by the SAIGE Project.

Measure 2.3: Communication of scientific knowledge with the aim of social benefit and increased visibility of science							
Implementing entity: Ministry of Education, Science and Technological Development							
Implementation period: from 2021 to 2023				Type of measure: Informative - educational			
Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
A network of research and educational centers has been established on the territory of the Republic of Serbia	Number	MESTD	23	2020	25	27	30
Number of citizens who follow science-inspired media content (cumulative)	Number	CPS	30,000	2020	35,000	45,000	60,000
Number of funded civic research projects (per year)	Number	CPS	0	2020	0	5	5
Number of promotions of newly developed and commercialized new products and services in ST parks (cumulative)	Number	STP	10	2020	12	14	18

Source of funding of the measure	Link to the program budget	Total estimated financial resources in 000 RSD		
		In 2021	In 2022	In 2023
Revenues from the budget				
Financial assistance of the EU				

Activity name	Implementing entity	Implementing partner institutions	Deadline for completion of the activity	Source of funding	Link to the program budget	Total estimated financial resources by sources in 000 RSD		
						2021	2022	2023
2.3.1. Establishment of a network of research and education centers coordinated by the CPS	MESTD	CPS	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0006	10,000	12,500	15,000
2.3.2. Promotion of popular science and technology programs	CPS	MESTD, SRO Science Fund of the Republic of Serbia	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0006	98,000	87,500	85,000

2.3.3. Support to the projects of civic science through public calls for joint projects of citizens and the scientific community	CPS	MESTD, Science Fund of the RoS	2 nd quarter of 2022	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0006	-	15,000	15,000
2.3.4. Increasing visibility and availability of scientific research and technological results through promotional events	MESTD	CPS, Office for IT and eGovernment	4 th quarter of 2023	Resources are not provided	-	-	-	-
2.3.5. Promotion of new products / services generated through ST parks	STP	MESTD	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0011, PJ 4007, PJ 4008	-	-	-

Measure 2.4: Development and adoption of the study on the potential of scientific research organizations to contribute to the improvement of public policies and cultural development while respecting the specifics of the social sciences and humanities

Implementing entity: Ministry of Education, Science and Technological Development

Implementation period: from 2021 to 2023

Type of measure: Incentive

Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
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Developed study on the potential of scientific research organizations to contribute to the improvement of public policies and cultural development while respecting the specifics of the social sciences and humanities	NO/YES	MESTD	NO	2020	NO	YES	-
Study on the potential of scientific research organizations to contribute to the improvement of public policies and cultural development adopted, respecting the specifics of the social sciences and humanities	NO/YES	MESTD	NO	2020	NO	YES	-
Adopted Program for the implementation of the Study on the potential of scientific research organizations to contribute to the improvement of public policies and cultural development while respecting the specifics of the social sciences and humanities	NO/YES	MESTD	NO	2020	NO	YES	-

Source of funding of the measure	Link to the program budget	Total estimated financial resources in 000 RSD		
		In 2021	In 2022	In 2023
Revenues from the Budget		-	-	-
Financial assistance of the EU		-	-	-

Activity name	Implementing entity	Implementing partner institutions	Deadline for completion of the activity	Source of funding	Link to the program budget	Total estimated financial resources by sources in 000 RSD		
						2021	2022	2023
2.4.1. Preparation of a Study on the potential of scientific research organizations to contribute to the improvement of public policies and cultural development while respecting the specifics of the social sciences and humanities	IP Institute, KONUS	MESTD	4 th quarter of 2022	Resources are not provided	-	-	-	-
2.4.2. Adoption of the Study on the potential of scientific research organizations to contribute to the improvement of public policies and cultural development while respecting the specifics of the social sciences and humanities	MESTD	IP Institute, KONUS	4 th quarter of 2022	Resources are not provided	-	-	-	-

2.4.3. Development of the program for implementation of the Study on the potential of scientific research organizations to contribute to the improvement of public policies and cultural development while respecting the specifics of the social sciences and humanities	IP Institute, KONUS	Science Fund of the Republic of Serbia, MESTD	4 th quarter of 2022	Resources are not provided	-	-	-	-
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Specific objective 3: Nurturing the top quality of science and technological development and strengthening the competitiveness of the economy							
Institution responsible for monitoring and control of implementation: Ministry of Education, Science and Technological Development							
Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
Total citations	Number	SCOPUS, WoS	216,000	2019	253,000	297,000	348,000
Number of scientific papers (annually)	Number	SCOPUS, WoS	8,800	2019	9,000	9,200	9,500
Ranking of the Republic of Serbia according to the Global Innovation Index	Position	WIPO	53	2020	51	49	46

Measure 3.1: Support to the quality of basic research.							
Implementing entity: Ministry of Education, Science and Technological Development							
Implementation period: from 2021 to 2023				Type of measure: Incentive			
Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
Adopted amendments and supplements to the Law on Science Fund of the Republic of Serbia	NO / YES	MESTD	NO	2020.	NO	NO	YES
Number of published papers in journals with impact factor (annually)	Number	SCOPUS, WoS	5950	2019	6000	6100	6200

Number of technical solutions implemented in the country and abroad (annually)	Number	Reports of the R&D Institutes	110	2020	120	130	140
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Number of published papers in high-ranking journals according to the <i>GII</i> (per year)	Number	<i>SCOPUS, WoS</i>	890	2019	930	970	1010
Number of published monographs of the world's leading publishers (annually)	Number (estimate number)	<i>Dimensions</i>	<100	2019	100	120	150
Number of researchers who are in the top 10% in the world in terms of the number of citations (annually)	Number	<i>SCOPUS, WoS</i>	420	2019	425	430	440
Number of researchers who participated in scientific conferences and meetings in the working body of the scientific conference abroad (annually)	Number	Report of the MESTD	711	2019	720	730	740

Source of funding of the measure	Link to the program budget	Total estimated financial resources in 000 RSD		
		In 2021	In 2022	In 2023
Revenues from the Budget	PA 0001, PA 0013	16,474,566	16,474,566	16,474,566
Financial assistance of the EU		-	-	-

Activity name	Implementing entity	Implementing partner institutions	Deadline for completion of the activity	Source of funding	Link to the program budget	Total estimated financial resources by sources in 000 RSD		
						2021	2022	2023
3.1.1. Adoption of amendments and supplements of the Law on the Science Fund of the Republic of Serbia	MESTD		4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0007 (regular allocations)	-	-	-
3.1.2. Institutional support for the realization of scientific research activities in SRO	MESTD		4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0013	14,830,805	14,830,805	14,830,805
3.1.3 Project support to scientific research activities through the implementation of existing and adoption of new programs of the Science Fund of the Republic of Serbia ⁵¹	Science Fund of the Republic of Serbia	MESTD	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0013	1,000,000	1,000,000	1,000,000

⁵¹ Funds for the implementation of the activity 3.1.3. are planned from the approved resources based on the Loan Agreement (Serbia Accelerating Innovation and Entrepreneurship Project), signed between the Republic of Serbia and the International Bank for Reconstruction and Development, No. IBRD 90290YF, in accordance with the Law on Ratification of the Loan Agreement ("Official Gazette of the Republic of Serbia – International Agreements", No. 3/20). In addition, the European Commission, which considers the World Bank to be a reliable partner, has decided to implement its donor funds from IPA 2019 planned for the area of Competitiveness, through the World Bank within the components defined by the SAIGE Project

3.1.4. Support to scientific research work of SASA, Matica Srpska and other institutions	MESTD		4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0001	127,223	127,223	127,223
3.1.5 Support for researchers with highly cites papers (top 10% in the field)	MESTD		4 th quarter of 2023	Resources are not provided	-	-	-	-
3.1.6. Support for publication in scientific journals with a high impact factor	MESTD		4 th quarter of 2023	Resources are not provided	-	-	-	-
3.1.7. Support for publishing in monographs of the world's leading publishers	MESTD		4 th quarter of 2023	Resources are not provided	-	-	-	-
3.1.8. Support to institutions with high international recognition	MESTD		4 th quarter of 2023	Resources are not provided	-	-	-	-
3.1.9. Support to the procurement of scientific research literature and access to electronic scientific databases, bibliometric analysis and publishing of scientific publications and	MESTD	National Library of Serbia	4 th quarter of 2023	01 General revenues and receipts from the Budget	001 Development of science and technology / PA 0001	417,538	417,538	417,538

holding scientific meetings and membership of scientific research organizations and scientific and scientific professional societies in international scientific organizations / associations								
3.1.10. Support for the participation of researchers in scientific conferences and meetings of the working body of the scientific conference abroad and the visit of researchers from abroad in the Republic of Serbia	MESTD		4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0001	64,000	64,000	64,000
3.1.11. Support to the organizations dealing with additional education and training of talented pupils and students to engage in scientific research	MESTD		4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0001	35,000	35,000	35,000

Measure 3.2: Support to the increased quality of technological development							
Implementing entity: Ministry of Education, Science and Technological Development							
Implementation period: from 2021 to 2023				Type of measure: Incentive			
Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
Number of joint science and business projects through the grant scheme of the Innovation Fund (cumulative)	Number	Report on the realization of the work program of the Innovation Fund	36	2020	56	66	76
Number of companies that commercialized new / improved products by companies supported through the grant scheme of the Innovation Fund (cumulative)	Number	Report on the realization of the work program of the Innovation Fund	83	2019	130	200	270
Number of SRO services provided to companies through innovation voucehrs (cumulative)	Number	Report on the realization of the work program of the Innovation Fund	632	2020	782	982	1182

Number of filed patent applications (cumulative)	Number	Report on the realization of the work program of the Innovation Fund	56	2019	66	76	86
Adopted laws and bylaws that regulate innovation and work of the Innovation Fund	NO/YES	Report on the work of the National Assembly	Current law	2020	NO	YES	-
Number of researchers that have passed trainings on IP and TT (annually)	Number	Annual report on the work of the IP Institute	620	2019	470	600	600
Number of newly registered startup companies in STP (cumulative)	Percentage	Annual report on the work of the STP	100	2020	110	120	140

Source of funding of the measure	Link to the program budget	Total estimated financial resources in 000 RSD		
		In 2021	In 2022	In 2023
Revenues from the Budget and Financial assistance of the EU	PA 0005, PJ 7023, PJ 4004, PJ 7089, PA 0011, PJ 4007, PJ 4008 and PJ 4010	1,713,960	2,607,500	2,524,500

Activity name	Implementing entity	Implementing partner institutions	Deadline for completion of the activity	Source of funding	Link to the program budget	Total estimated financial resources by sources in 000 RSD		
						2021	2022	2023
3.2.1. Adoption of a law regulating innovation activity and the work of the Innovation Fund	MESTD	Innovation Fund	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0007 (regular allocations)	-	-	-
3.2.2. Project support to innovation through the implementation of existing and adoption of new programs of the Innovation Fund ⁵²	Innovation Fund	MESTD	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201- Development of science and technology / PA 0005	1. 260. 000	1. 260. 000	1. 260. 000

⁵² Funds for the financing of the activity 3.2.2. implemented by the Innovation Fund, are provided in accordance with the Law on Budget of the republic of Serbia for 2021 ("Official Gazette of the Republic of Serbia", No. 149/20) in the program activity 0005 "Support to the work of the Innovation Fund". With the allocated resources from the budget, funds are planned based on the Loan Agreement (Serbia Accelerating Innovation and Entrepreneurship Project), signed between the Republic of Serbia and the International Bank for Reconstruction and Development, No. IBRD 90290YF, in accordance with the Law on Ratification of the Loan Agreement ("Official Gazette of the Republic of Serbia – International Agreements", No. 3/20). In addition, the European Commission, which considers the World Bank to be a reliable partner, has decided to implement its donor funds from IPA 2019 planned for the area of Competitiveness, through the World Bank within the components defined by the SAIGE Project.

				01 General revenues and receipts from the Budget, 56 Financial assistance of the EU	PJ 7023, PJ 4004 and PJ 7079	377,960	1,285,500	1,207,500
3.2.3. Capacity building for technology transfer at the level of SRO through trainings	MESTD	IP Institute, SRO	4 th quarter of 2023	Resources are not provided	-	-	-	-
3.2.4. Infrastructure and professional support to innovation entities through the implementation of the work program of the STP network ⁵³	STP	MESTD	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0011, PJ 4007 and PJ 4008	72,000	62,000	57,000
3.2.5. Establishment of new STPs	MESTD	STP	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PJ 4010	4.000		

⁵³ Implementation of the activity 3.2.4. is implemented through the support of work of the STPs and those are: STP Belgrade, STP Cacak and STP Nis, in accordance with the Programs and plans of work adopted by the Government of the Republic of Serbia.

Specific objective 4: Focusing research on social challenges and priorities							
Institution responsible for monitoring and control of implementation: Ministry of Education, Science and Technological Development							
Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
Number of announced public calls by targeted programs, according to identified social challenges, as well as priorities of the Smart Specialization Strategy	Number	Report on the work of the Science Fund of the Republic of Serbia, Innovation Fund and annual reports of the National Council for Scientific and Technological Development	0	2020	-	2	5

Measure 4.1: Establishing a mechanism used to nominate social challenges as scientific research topics and establishing expertise for public administration.							
Implementing entity: Ministry of Education, Science and Technological Development							
Implementation period: from 2021 to 2023				Type of measure: Institutional managerial-organizational			
Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
A mechanism has been established to identify social challenges	NO/YES	Minutes of the meeting of the Council for Social Challenges	NO	2020	NO	YES	-

Source of funding of the measure	Link to the program budget	Total estimated financial resources in 000 RSD		
		In 2021	In 2022	In 2023
Revenues from the Budget		-	-	-
Financial assistance of the EU		-	-	-

Activity name	Implementing entity	Implementing partner institutions	Deadline for completion of the activity	Source of funding	Link to the program budget	Total estimated financial resources by sources in 000 RSD		
						2021	2022	2023
4.1.1. Establishing of the Council for Social Challenges	Government	MESTD	4 th quarter of 2021	Resources are not provided	-	-	-	-
4.1.2. Setting up the procedures used to nominated social challenges	Government	MESTD and other ministries	1 st quarter of 2022	Resources are not provided	-	-	-	-
4.1.3. Establishing financial support used to solve selected social challenges	Science Fund of the Republic of Serbia, Innovation Fund	MESTD	3 rd quarter of 2021	Resources are not provided	-	-	-	-

Measure 4.2: Implementation of target programs based on the Smart Specialization Strategy and other strategies							
Implementing entity: Ministry of Education, Science and Technological Development							
Implementation period: from 2021 to 2023				Type of measure: Institutional managerial-organizational			
Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
Updated list of priority technologies	NO/YES	Reports of the Council for Social Challenges	NO	2020	NO	YES	

Source of funding of the measure	Link to the program budget	Total estimated financial resources in 000 RSD		
		In 2021	In 2022	In 2023
Budgets from the revenue		-	-	-
Financial assistance of the EU		-	-	-

Activity name	Implementing entity	Implementing partner institutions	Deadline for completion of the activity	Source of funding	Link to the program budget	Total estimated financial resources by sources in 000 RSD		
						2021	2022	2023
4.2.1. Establishment of a working body for harmonization of support to scientific research and innovation activities according to the established and revised priorities of the	MESTD	Science Fund of the Republic of Serbia, Innovation Fund	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0007 (regular allocations)	-	-	-

Smart Specialization Strategy								
4.2.2. Development of recommendations to the Innovation Fund and the Science Fund of the Republic of Serbia	MESTD	Science Fund of the Republic of Serbia, Innovation Fund	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0007 (regular allocations)	-	-	-

Specific objective 5: Strengthening international cooperation							
Institution responsible for monitoring and control of implementation: Ministry of Education, Science and Technological Development							
Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
Degree of international links compared to the base year	%	Indicators from measures	100	2020	110	120	130

Measure 5.1: Improving participation in European science and innovation programs							
Implementing entity: Ministry of Education, Science and Technological Development							
Implementation period: from 2021 to 2023				Type of measure: Incentive			
Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
Realized national contributions in the joint budget of the EU program for science and research – Horizon Europe - HEU	NO/YES	Financial report of the MESTD	NO	2020	YES	YES	YES

Number of contracted HEU projects (per year)	Number	Electronic database of the European Commission <i>E-corda</i>	0	2020	20	50	50
Number of organizations from the Republic of Serbia participating in the HEU program (annually)	Number	Electronic database of the European Commission <i>E-corda</i>	0	2020	30	75	75
Percentage of participation of our researchers in current <i>COST</i> actions	%	Reports of the <i>COST Secretariat</i>	93	2020	93,5	94	94,5
Number of approved EUREKA projects in which researchers from the Republic of Serbia participate (annually)	Number	Reports of the EUREKA Secretariat	11	2020	8	10	10
Established Committee for International Cooperation	NO/YES	MESTD	NO	2020	YES	-	-

Source of funding of the measure	Link to the program budget	Total estimated financial resources in 000 RSD		
		In 2021	In 2022	In 2023
Revenues from the Budget	PJ 7010 and PA 0001	2,087,400	2,087,400	2,087,400
Financial assistance of the EU		-	-	-

Activity name	Implementing entity	Implementing partner institutions	Deadline for completion of the activity	Source of funding	Link to the program budget	Total estimated financial resources by sources in 000 RSD		
						2021	2022	2023
5.1.1. Realization of the national contribution to the joint budget of the EU program for science and research of the EU	MESTD	Ministry of Finance	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PJ 7010	2,000,000	2,000,000	2,000,000
5.1.2. Implementation of training programs for improving the capacity of the National focal persons for HEU	MESTD	National focal points	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0001	200	200	200
5.1.3. Organization of info-days and training for researchers, business entities and CSOs to apply for projects to the HEU program	MESTD	Chamber of Commerce, Ministry of Economy, CPS	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0001	400	400	400
5.1.4. Institutional support for the realization of scientific research activities of SRO in COST and EUREKA projects	MESTD	SRO	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0001	86,800	86,800	86,800
5.1.5. Establishment of the Committee for International Cooperation	MESTD	SRO	4 th quarter of 2021	Resources are not provided	-	-	-	-

Measure 5.2: Strengthening strategic bilateral and regional cooperation within the European macro-regions and the Western Balkans region							
Implementing entity: Ministry of Education, Science and Technological Development							
Implementation period: from 2021 to 2023				Type of measure: Incentive			
Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
Number of initiated bilateral, regional and multilateral cooperation programs per year	Number	MESTD	2	2020	1	1	1
Number of approved projects with participation of the institutions from Serbia (cumulative)	Number	MESTD	270	2020	300	310	320

Source of funding of the measure	Link to the program budget	Total estimated financial resources in 000 RSD		
		In 2021	In 2022	In 2023
Revenues from the Budget	PA 0001	74,900	74,900	74,900
Financial assistance of the EU		-	-	-

Activity name	Implementing entity	Implementing partner institutions	Deadline for completion of the activity	Source of funding	Link to the program budget	Total estimated financial resources by sources in 000 RSD		
						2021	2022	2023
5.2.1. Establishing new strategic bilateral programs with leading countries in the field of science, technology and innovation as well as with countries in the region	MESTD	SRO	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0001, PJ 4003	69,500	69,500	69,500
5.2.2. Coordination of activities related to the implementation of the European Strategy for the Danube and Adriatic-Ionian Region	MESTD	SRO	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0007 (regular allocations)	-	-	-

5.2.3. Establishment and further development of regional and multilateral cooperation	MESTD	European Commission, SRO	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology / PA 0001	5,400	5,400	5,400
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Measure 5.3: Providing acces to international research infrastructure							
Implementing entity: Ministry of Education, Science and Technological Development							
Implementation period: from 2021 to 2023				Type of measure: Incentive			
Indicator(s) at the level of the measure	Unit measure	Source of verification	Baseline	Base year	Target value in 2021	Target value in 2022	Target value in 2023
Providing access to international research infrastructure	NO/YES	MESTD	NO	2020	YES	YES	YES
Number of SROs from the Republic of Serbia that use international research infrastructure (cumulative)	Number	Reports of international research organizations	14	2020	15	16	17

Source of funding of the measure	Link to the program budget	Total estimated financial resources in 000 RSD		
		In 2021	In 2022	In 2023
Revenues from the Budget	PA 0001	482,521	482,521	482,521
Financial assistance of the EU		-	-	-

Activity name	Implementing entity	Implementing partner institutions	Deadline for completion of the activity	Source of funding	Link to the program budget	Total estimated financial resources by sources in 000 RSD		
						2021	2022	2023
5.3.1. Realization of the national contribution for providing access to the international research infrastructure	MESTD		4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology/PA 0001	482,521	482,521	482,521
5.3.2. Adoption of legislation and establishment of procedures for participation of institutions from the Republic of Serbia in the European Research Infrastructure Consortium (<i>ERIC</i>)	MESTD	SRO	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology/PA 0007 (regular allocations)	-	-	-
5.3.3. Continuation of activities on the inclusion of the Republic of Serbia in the European Research Infrastructure Consortium (<i>ERIC</i>)	MESTD	SRO	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology/PA 0007 (regular allocations)	-	-	-

5.3.4. Continuation of activities on the inclusion of the Republic of Serbia in the Joint Research Centre (<i>JRC</i>)	MESTD	SRO	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology/PA 0007 (regular allocations)	-	-	-
5.3.5. Continuation of participation of the Republic of Serbia in the activities of international research organizations (CERN, Dubna, Fulbright)	MESTD	SRO	4 th quarter of 2023	01 General revenues and receipts from the Budget	0201 Development of science and technology/PA 0007 (regular allocations)	-	-	-

