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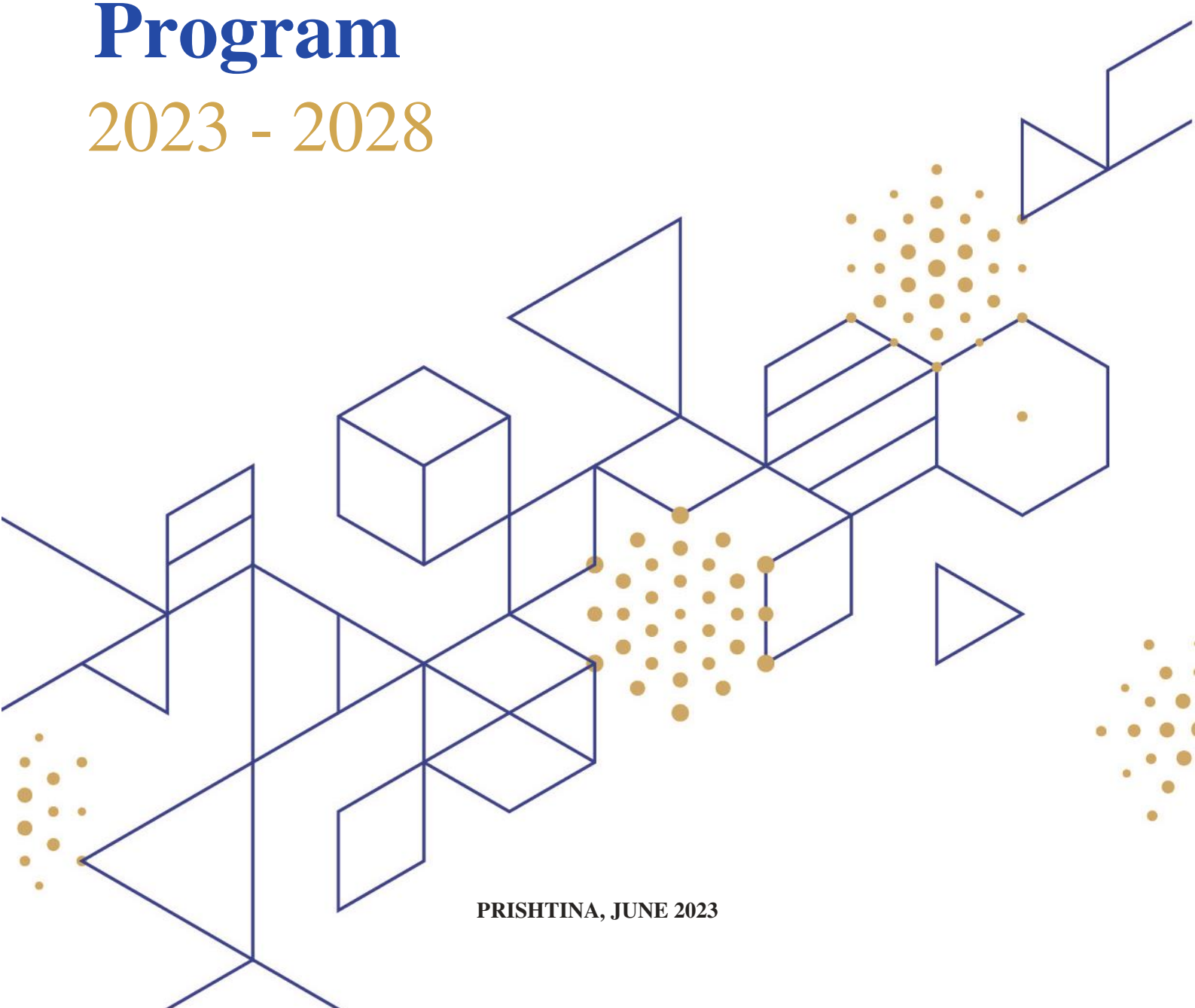
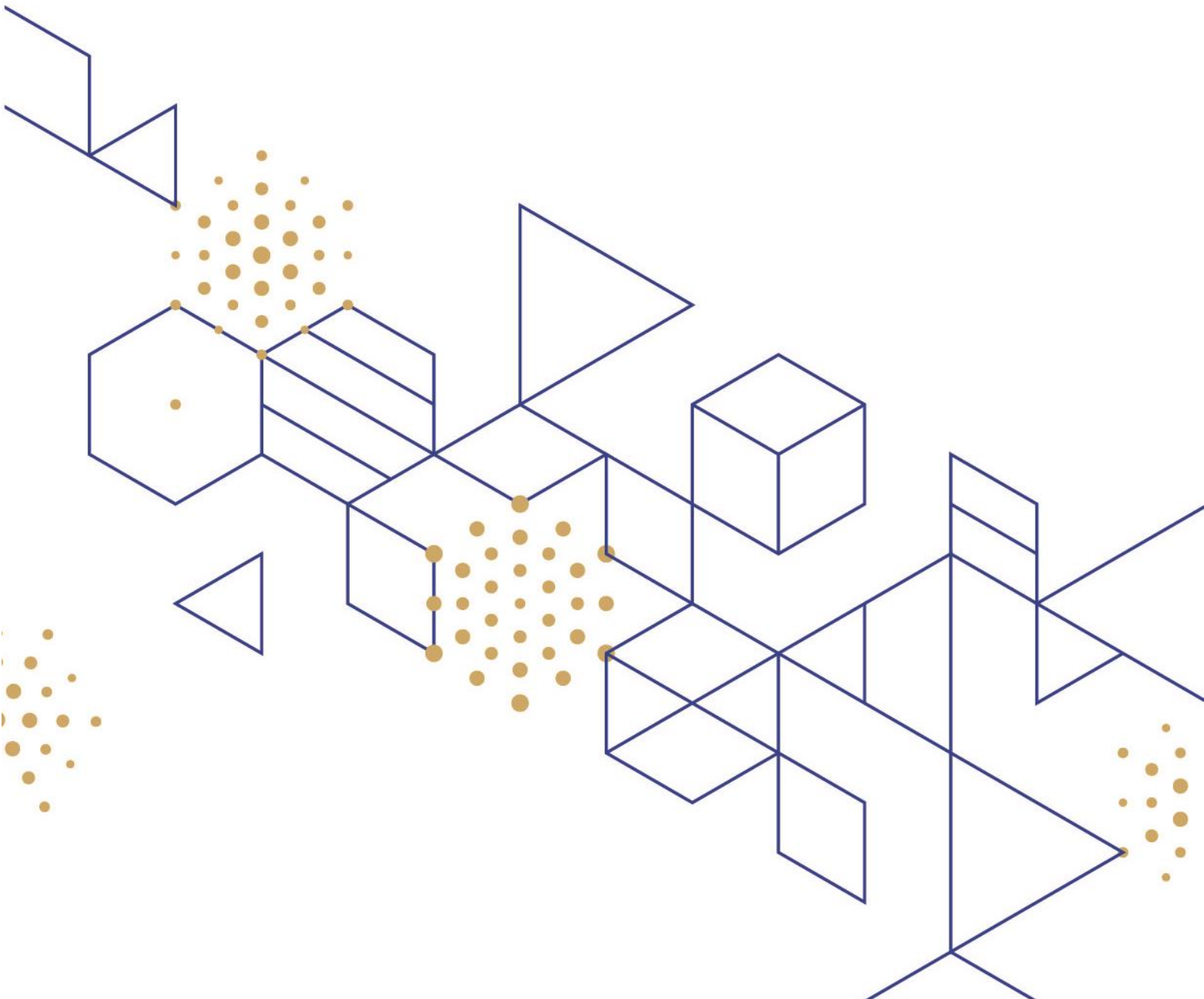
KËSHILLI KOMBËTAR I SHKENCËS | NACIONALNI SAVET ZA NAUKU | NATIONAL SCIENCE COUNCIL

# National Science Program

## 2023 - 2028



**PRISHTINA, JUNE 2023**



# National Science Council

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This document was approved by the National Science Council at the meeting held on December 23, 2022.

Contents

Abbreviations

## Abbreviations

| | |
|---|---|
| KAA | Kosovo Accreditation Agency |
| NSRA | National Scientific Research Agency |
| EU | European Union |
| IC | International Cooperation |
| GDP | Gross Domestic Product |
| ERA | European Research Area |
| HERAS | Higher Education, Research and Applied Science |
| IT/TI | Information Technology |
| HEI | Higher Education Institution |
| LHE | Law on Higher Education in the Republic of Kosovo |
| LSRA | Law on Scientific Research Activity |
| MESTI | Ministry of Education, Science, Technology and Innovation |
| MFLT | Ministry of Finance, Labor and Transfers |
| MIET | Ministry of Industry, Enterprise, and Trade |
| GK | Government of Kosovo |
| NGO | Non-Governmental Organization |
| NSC | National Science Council |
| NSP | National Science Program |
| ResearchCult | Enhancing Research Culture in Higher Education Institutions in Kosovo |
| KRIS (CRIS) | Research Information Management System |
| SR &I | Scientific Research & Innovation |
| RTD | Research and Technological Development |
| RTDI | Research, Technological Development, and Innovation |
| SEEIIST | The South East European International Institute for Sustainable Technologies |
| SME | Small and Medium Enterprises |
| ICT | Information and Communication Technology |
| UNFCCC | United Nations Framework Convention on Climate Change |
| WHO | World Health Organization |
| IMCB | Interinstitutional Monitoring Coordinating Body |
| MD | Ministry of Defense |
| MIA | Ministry of Internal Affairs |
| MAFRD | Ministry of Agriculture, Forestry and Rural Development |
| MED | Ministry of Economic Development |
| MESPI | Ministry of Environment, Spatial Planning and Infrastructure; |
| MoJ | Ministry of Justice |
| MoH | Ministry of Health |

# Executive Summary

Despite the many difficulties faced by the Republic of Kosovo, the development of science is considered necessary for the transformation of the economy of Kosovo into an economy based on knowledge, scientific achievements, use of new technologies and innovations, as a proven and necessary mechanism for the growth and advancement of the economic and social development of Kosovo. The National Science Program (NSP), based on Law No. 04/L-135 on Scientific Research Activity, is a document that guides scientific research policies in Kosovo, defining objectives and measures to support the coherence, efficiency and effectiveness of the national scientific research and innovation system. The proposed program takes as a starting point the previous science program, the orientation and challenges faced in the implementation of this program, as well as the National Development Strategy 2030 of the Republic of Kosovo and other development strategies of the country, the region and Europe, to enhance the standards achieved in recent years.

After identifying the challenges and evaluating all influencing factors, the National Science Program (NSP) proposes an orientation structure for the development of science, which has as its primary objective the implementation of a strategic, dynamic and comprehensive plan, capable of contributing to the development of society. To increase Kosovar scientific results at the international level and generate innovations with an impact on the economic and social development of Kosovo, this program addresses six objectives:

Objective 1: Development of an effective scientific research and innovation system;

Objective 2: Development and training of human capacities for scientific research activity;

Objective 3: Development of scientific research infrastructure;

Objective 4: Internationalization of scientific research activity;

Objective 5: Relationship between science, economy and society;

Objective 6. Scientific research excellence in specific fields.

The assessment of the current situation carried out through the analysis of key performance indicators, numerous reports at the country and international level, as well as active communications with the main actors, has identified numerous challenges regarding the design and administration of policies for the development of science in Kosovo. It should be highlighted: inefficient mechanisms for the implementation of development policies; the low budget allocated for scientific research and innovation, and the low productivity of scientific institutions in Kosovo. Being aware that all challenges cannot be addressed within a short period, the National Science Council, while proposing measures to achieve the above objectives, is based on three guiding principles:

1) Ethics in research and innovation;

2) Gender equality, inclusion and equity treatment for all and

3) Social responsibility.

At the same time, after the analysis of the real situation and relevant strategic documents, consultations with stakeholders, and based on priorities in the scientific fields of the EU, in the National Science Program, as important fields for the economic and social development of Kosovo for the next six-year period, development priorities have been set in four areas, while two other areas have been identified as cross-sectoral areas of special importance with horizontal impact on all other areas.

These priorities are:

1. Health;
2. Society - Education, culture, economy, humanities and social sciences;
3. Natural resources, Energy, Environment and Climate Change;

4. Agricultural Production, Food and Bioeconomy; and
   cross-sectoral horizontal fields:
5. Green Deal
6. Digitization.

At a time when Kosovo is faced with an economic difficulties, high unemployment, unsatisfactory quality in education, and uncompetitive universities with those of the region in the field of scientific research and healthcare in serious condition, investments in scientific research and innovation are an important part of the impact in improving the situation. Kosovo, although a relatively new state, has as a state strategic goal to increase its competitiveness with the states of the region, based on the advantages it has: academic scientific institutions with a tradition of over 50 years, economic sectors on the rise, especially in the fields of information and communications technology (ICT), young average age population, academic diaspora with significant achievements, the Academy of Sciences and Arts of Kosovo, seven public universities and two research institutes. To ensure a higher level of implementation of the NSP, a novelty in the proposed program is the identification of the responsible bearers for its implementation, such as government institutions, scientific institutions, public and private sector, industry and other stakeholders in the process, as well as every scientific worker from whom active engagement in the implementation of the proposed measures is expected. In the program, in addition to the objectives, activities, and key performance evaluation indicators for the fields, the mechanisms for monitoring and implementation of the NSP were introduced as novelties.

# 1. Introduction

Technological achievements and innovations based on scientific research are essential to enable the double green and digital transition as well as the country's resilient economic and social development. The most efficient way to generate sustainable jobs is to develop an economy based on knowledge, scientific achievements, and technological innovations. Also, research in the social sciences directly affects the country's linguistic, social and cultural development as well as the strengthening of the state's identity. While much remains to be done for Kosovo's economy to develop based on scientific research and innovation at the level of European countries, the science development in Kosovo is also extremely important and contributes directly to the strengthening of the first and second pillars of the National Development Strategy 2030[1]. In this context, the National Science Council, as the leading body for the systematic development of scientific and technological research activity policies in the Republic of Kosovo, has a key role in identifying the necessary measures to eliminate barriers affecting science and innovation development. The key objective of the Science Program 2023-2028 is the human capacity building and the infrastructure upgrade in Kosovo, which have a direct impact on economic development and increasing the participation of Kosovo institutions and SR&I researchers in the European Research Area (ERA) and increasing participation in Horizon Europe projects. Therefore, the key ERA principles, such as 1) Research and innovation ethics, 2) Gender equality, inclusion, and equal opportunities for all, and 3) Social responsibility are also the basic guiding principles of the National Science Program 2023-2028.

During the preparation of the National Science Program (NCP), few shortcomings of the scientific research system were pointed out, which inevitably affected the development of science in Kosovo. Although the law no. 04/L-135 on Research-Scientific Activities clearly defines the responsibilities of the National Science Council, including the evaluation of the development of science and technology in Kosovo, unfortunately the supporting infrastructure for the Council is still limited. Due to the lack of systematic studies on the development and challenges of scientific activities in Kosovo, during the preparation of the NCP, the NCP has relied on 1) limited information from the MESTI Department of Science, 2) data on scientific publications obtained from the Scopus platform, 3 ) temporary and partial studies by non-governmental organizations, 4) workshops organized by National Science Council and 5) direct consultations with representatives of public and private institutions interested in the development of scientific work in Kosovo.

After assessing the current state of scientific achievements and innovations in Kosovo and identifying the

[1] National Development Strategy - 2030 - Office of the Prime Minister

challenges to the development of science and innovation, based on the expected interaction between basic sciences, citizens, and business, the National Science Program 2023-2028 aim at six strategic objectives, the implementation of which creates an effective framework on the elimination of barriers to Scientific Research and Innovation (SR&I). Each objective is accompanied by a series of ambitious but achievable measures, which require a sufficient and necessary financial framework for the realization of the objectives and the creation of a functional ecosystem for the support and promotion of scientific research and innovation. Also, taking into account the international circumstances within the region and beyond, especially the energy crisis and global warming, the strategies for the Euro-Atlantic integration of Kosovo, the strategy for smart specialization and that of the double green and digital transition, the National Science Program 2023 -2028 identifies scientific priority areas for SR&I in Kosovo.

## 2. State of scientific research in Kosovo

The first National Science Program, was drawn up in 2010, through its five ambitious objectives related to 1) the development of human capacities for scientific research activity, 2) the development of research infrastructure, 3) the internationalization of scientific research activity, 5) the strengthening of connections between science, society, and economy and 5) promotion of excellence in scientific research activity has clearly defined the supporting framework for the development of science in Kosovo. However, the implementation of the activities proposed in the 2010 NSP has been partial. As a result, the performance in scientific achievements is expressed through publications (Figure 1), winning scientific grants under Horizon 2020 (Figure 2), and the number of patents/innovations that remain very low compared to other countries in the region.

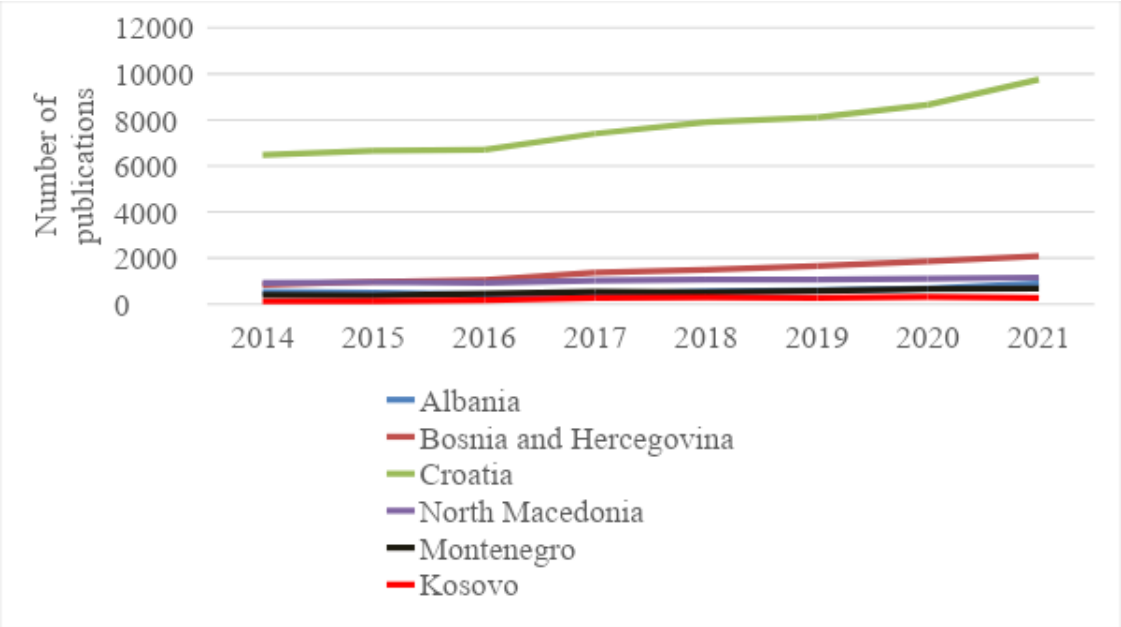


**Figure 1.** Scientific publications per population [Scopus, September 2022].

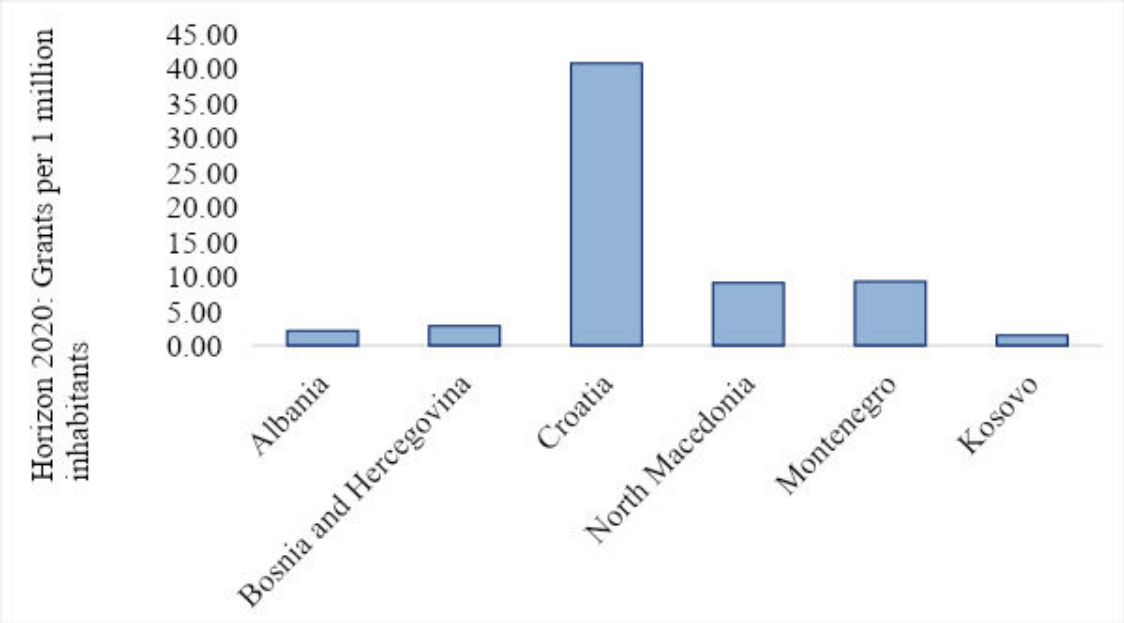


**Figure 2.** Scientific grants in euros under Horizon 2020 per population [Scopus, September 2022]

The impact of publications from Kosovo on the development of science in general, expressed through the Field Weight Citation Index (FWCI), which takes into account the number of citations, is below the average impact at the international level (Figure 3). This overview of the performance of Kosovo's scientific institutions is also a consequence of the failure to achieve the objectives and to implement the measures proposed in the National Science Program 2010. In this regard, much remains to be done, for the scientific profile of Kosovo, both in terms of scientific impact and quantity, to enable the active participation of our country in ERA.

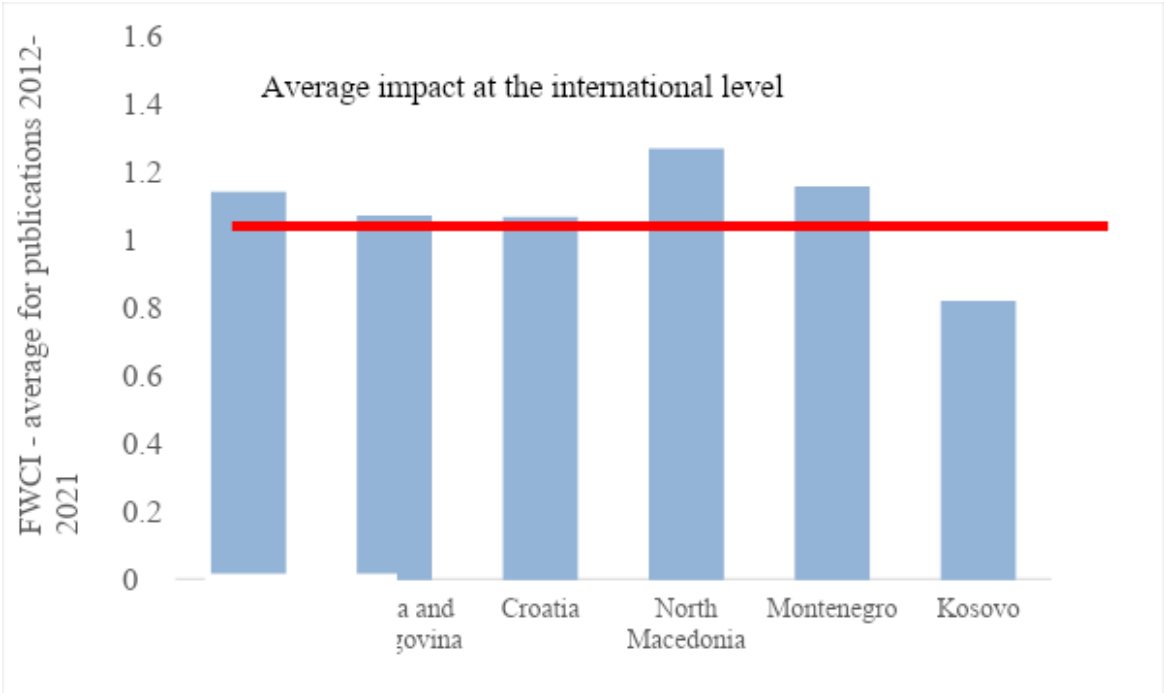


**Figure 3.** FWCI as an indicator of the impact of scientific publications on the development of science [Scopus, September 2022]

Reports[2,3,45] evaluating progress for each NSP 2010 objectives show that progress has been much lower than planned. However, during the period covered by NSP 2010, a significant increase in the number of scientific publications can be seen, although in terms of number (Figure 1) and their impact is still below the international level average (Figure 4). This increase in publications is promising as it shows the increased interest of scientific institutions in Kosovo for scientific research work. Undoubtedly, one of the achievements of NSP 2010 is that it highlights the barriers to science and innovation in Kosovo and the lack of efficient mechanisms for supporting and evaluating scientific achievements at the national and international levels.

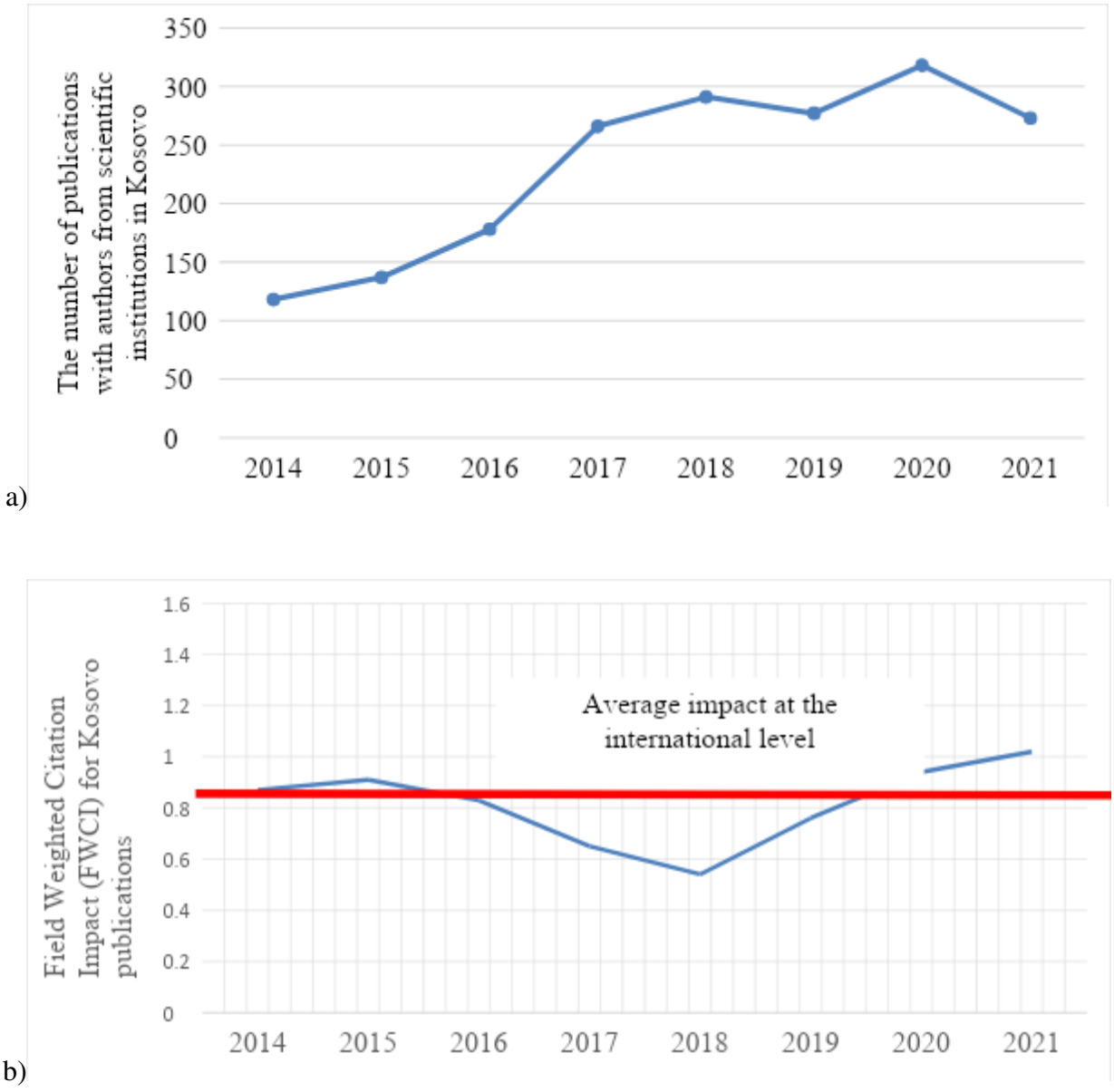


**Figure 4.** Publications from the scientific institutions of Kosovo for the period 2014-2021
a) number and b) FWCI [Scopus, September 2022]

[2] HERAS, Mapping the Research and Innovation System in Kosovo, 2019 https://www.heraskosovo.org/publications/Koncept_dokument_Hartezimi_i_Sistemit_te_Kerkimit_dhe_Inovacionit_ne_Kosove.pdf;;

[3] EC, Progress Report for Kosovo, Kosovo Report 2022 (europa.eu), October 2022

[4] ResearchCult, Enhancing Research Culture in Higher Education in Kosovo, 2022

[5] EC, Progress Report for Kosovo, 2022. Kosovo Report 2022.pdf (europa.eu)

From the data analysis[6, 1-4,7] as well as the workshops held with researchers from HEIs and research institutes and other stakeholders, three challenges have been identified which hinder the development of science and innovation:

I. Inefficient legal framework and not clearly defined policies for Scientific Research and Innovation (SR&I) in Kosovo;

II. Inefficient mechanisms for institutional support of SR&I, including low budget;

III. Low productivity of SR&I institutions.

These three challenges are closely related to each other and improving the situation requires addressing all three simultaneously.

**I.** Legal framework and policies on SR&I

Figure 5 shows the organization chart of the main stakeholders in the SR&I system in Kosovo, as well as the interaction between these institutions. To create a functional system of scientific research and innovation, it is necessary to identify various obstacles in each link of this system.

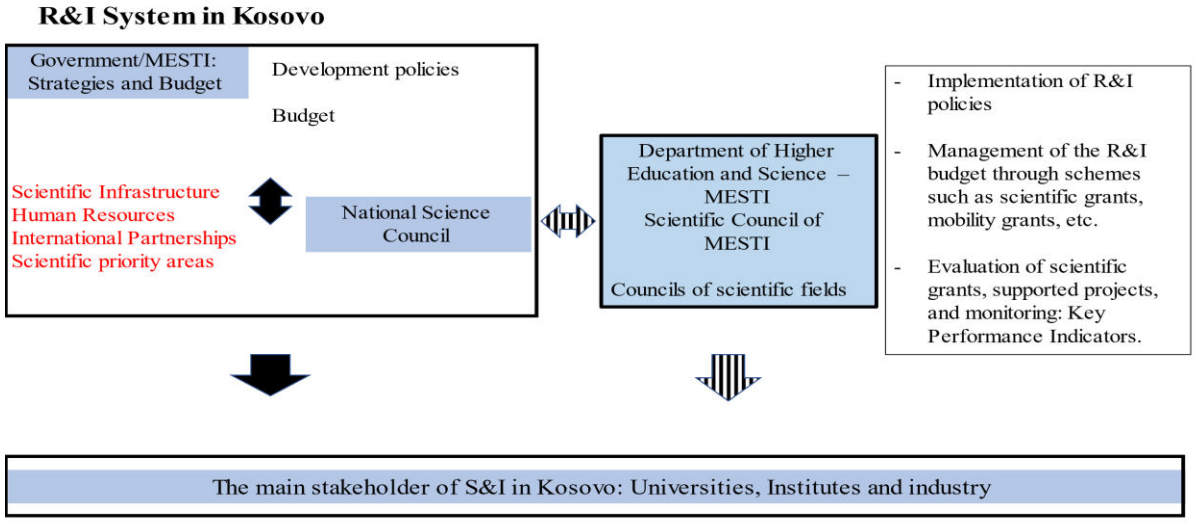


**Figure 5.** SR&I System in Kosovo

In the course of the implementation period of the NSP 2010-2015, it was observed that there are deficiencies in the basic laws that directly or indirectly address scientific research. These laws are the Law on Higher Education in the Republic of Kosovo (LHE), the Law on Scientific Research Activity (LSRA), and Law on Scientific Innovation and Transfer of Knowledge and Technology.

In the current law on Higher Education in the Republic of Kosovo (LHE), scientific research is not imposed with clear criteria as a necessary and main activity for the functioning of a Higher Education Institution (HEI)/university. The primary task of an HEI is the preparation of new cadres which is accomplished through the transmission of prior knowledge and knowledge creation. Therefore, the HEI that organizes study programs at three study levels has three specific missions: teaching, fundamental and applied scientific research closely linked to industry, and knowledge and technology transfer as well as innovation.

The Law on SRA deals only with the component of scientific research that is carried out in HEIs and scientific research institutes, but there is no clear connection between LSRA and LHE regarding the engagement of academic staff in scientific research work. Also, there is a lack of profiling of the academic staff depending on the orientation in teaching or scientific research. The legal framework should regulate these issues because

[6] ResearchCult, Enhancing Research Culture in Higher Education in Kosovo, 2022

[7] EC, Progress Report for Kosovo, 2022. Kosovo Report 2022.pdf (europa.eu)

the scientific contribution of the academic staff in the HEI must be regulated explicitly based on the laws.

In 2018, the Law on Scientific Innovation and Transfer of Knowledge and Technology was also adopted, so these three laws must be completed and harmonized to specify the obligations of the academic staff of universities and scientific employees of scientific research institutes. Contribution to scientific research and innovation should be an integral part of the obligations under the contract.

Other laws and administrative instructions of importance for scientific research are:

- Law on industrial property

This law regulates the system of granting and protecting industrial property rights. The protection of industrial property has as its object: a) inventions protected by patents and utility models; b) industrial designs; c) trademarks and service marks; d) geographical indicators.

- Administrative Instruction on the Accreditation of Higher Education Institutions in the Republic of Kosovo and Administrative Instruction on the Registration and Licensing of Scientific Research Institutions.

These documents also seem to address quality assurance and clearly define the criteria for licensing and accreditation of these institutions.

## II. Institutional support for SR&I

According to the Law on Scientific Research Activity[8], the budget for financing scientific research is set at 0.7% of the annual budget, but until now the budget allocated for science by all governments of Kosovo has not exceeded the value of 0.1% of the budget of Kosovo[9]. These values are much smaller than the number of funds allocated at the level of the EU countries. For example, in 2020, the total amount of funds allocated for scientific research and development in EU countries was 311 billion euros, which represents 2.3% of its Gross Domestic Product (GDP).[10] But on the other hand, even the scientific research institutions themselves in Kosovo have shown a limited ability to absorb this reduced budget[11], see Figure 6. Moreover, the distribution of this budget is also characterized by non-transparency[12] and complicated procedures for application, and often as a result there was a demotivation of the academic staff to apply for grants for scientific projects.

The lack of recognition of the scientific research contribution of the scientific workers defined in the LSRA by the universities of Kosovo according to the LHE has hindered the separation of teaching activities from research activities, and as a result of this, there is a lack of proper assessment of research work during engagement in universities. The financing of scientific research through the allocation of the budget for higher education institutions is unclear since the budget for scientific research and innovation is not separated from the budget for university studies. As a consequence, the valuation of the academic staff for engagements in scientific projects is not institutionalized.

To continuously monitor the implementation of research and innovation policies in Kosovo based on accurate evidence, it is necessary to support systems that collect and accumulate systematic data on essential research and innovation indicators. Currently, MESTI, with support from ResearchCult[13] and Heras+[14], is developing the Research Information Management System (KRIS[15]), as a platform for storing national information in the field of research in Kosovo. Currentl,y KRIS is being developed into five main modules: Research Institutions, Researchers, Research Infrastructure, Research Journals, Projects, and Research Funding. In addition to the current role of KRIS in collecting research information on the important indicators of the development of

[8] LAW No. 04/L-135 ON SCIENTIFIC RESEARCH ACTIVITY

[9] EC, Progress Report for Kosovo, Kosovo Report 2021 (europa.eu), October 2022;

[10] EUROSTAT, https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20211129-2, 2022.

[11] HERAS, Mapping the Research and Innovation System in Kosovo, 2019. https://www.heraskosovo.org/publications/Koncept_dokument_Hartezimi_i_Sistemit_te_Kerkimit_dhe_Inovacionit_ne_Kosove.pdf

[12] HERAS, Status quo of Research and Innovation development in Kosovo: Thoughts for Kosovo's future R&I", a roundtable and workshop organised by HERAS Kosovo, https://www.heraskosovo.org/publications/Policy_Briefing_Paper.pdf, 2020

[13] Erasmus + project "Enhancing research capacities in higher education in Kosovo (ResearchCult: https://researchcult.net/)", Assessment-of-Research-Capacities-in-Kosovo-universities_EN-SQ-SRB_FINAL-1.pdf (researchcult.net), 2021.

[14] Project "Higher Education Research and Applied Science Plus (HERAS+: https://www.heraskosovo.org/)"

[15] Kosova Research Information System

science in Kosovo, it is necessary to develop within KRIS the supporting role in research and innovation (allocation of grants). Currently, the supporting role of KRIS lies in the standardization of the systematic information that is intended to be collected in the current indicators, as well as in defining the publication standards, storage and indexing of scientific information and knowledge, as is the case with the module for scientific journals published by research institutions in Kosovo and beyond. Furthermore, KRIS must develop other important modules, such as: module for theadministration and management of the licensing process of research and innovation institutions in Kosovo; The module for the administration and management of the implementation of the National Science and Innovation Fund under the respective schemes; as well as other modules that focus on filing and regulating the field of innovation. In conclusion, the KRIS management system should serve as an open-access bibliographic platform, where scientific and academic knowledge is deposited (stored) and made available to the scientific and educational community (researchers, academicians, students, etc.), all the interested public, as well as to be at the service of policymakers, institutions, government organizations and industry.

III. Productivity in SR&I

The main bearers of scientific projects in Kosovo should be the Universities, but experience shows that they are mainly focused on teaching, and there is a lack of modern infrastructure to support scientific research[1], especially for carrying out scientific research within the topics that are part of doctoral programs.

The main bearers of scientific projects in Kosovo should be the Universities, but experience shows that they are mainly focused on teaching, and there is a lack of modern infrastructure to support scientific research1, especially for carrying out scientific research within the topics that are part of doctoral programs.

Scientific publications in public universities are mainly used as criteria for career advancement, which unfortunately in some cases has resulted in the involvement of staff in unethical actions related to publications. From this aspect, the academic staff shows little interest in using the opportunities for the application and development of scientific research projects through the Horizon program of the European Commission or government programs. For example, in the period 2014-2021, there were 133 applications from Kosovo, of which 124 were eligible, while only 24 of them were successful. In this program, the institutions that have applied for grants are mainly NGOs, enterprises, and Government departments, , while only two of them are from HEIs.

At the national level, interest in grants for small projects (up to 10,000 Euro) financed by MESTI, as the only mechanism for supporting scientific projects in Kosovo, is also low, although there seem to be differences depending on the field of study. In the 5 years from 2017 to 2021, only 122 applications were received in total or about 25 per year. Considering that in the public HEI of Kosovo, the number of academic staff is 1741 academic staff[16], the number of applications is very low, which reflects the extreme disinterest of the academic staff in scientific research, both in public and in private institutions.

Data on applicants and beneficiaries of small projects and scholarships for doctoral studies show that about 40% of applicants and beneficiaries are women. The unequal engagement according to gender in scientific activity is also documented by the lowest proportion of mobility by female scientific researchers, which is somewhere around 31%. Taking into account that the mobilities are mainly carried out by university academic staff, it can be said that the reasons for this lower engagement of women in scientific activity derive from issues that exceed the scope of the National Science Program and require a coordinated approach from all Kosovo state levels, including the National Science Council itself. Based on the analysis, insufficient cooperation in international projects and with the academic diaspora is observed, which is reflected in the small number of applications to the Horizon Europe program. The lack of a strategy for scientific research, and the lack of a critical mass of the scientific research cadre should also be highlighted; as well as the lack of doctoral programs.

[16]ResearchCult, 2021. Enhancing Research Culture in Higher Education in Kosovo. Assessment-of-Research-Capacities-in-Kosovo-universities_EN-SQ-SRB_FINAL-1.pdf (researchcult.net)

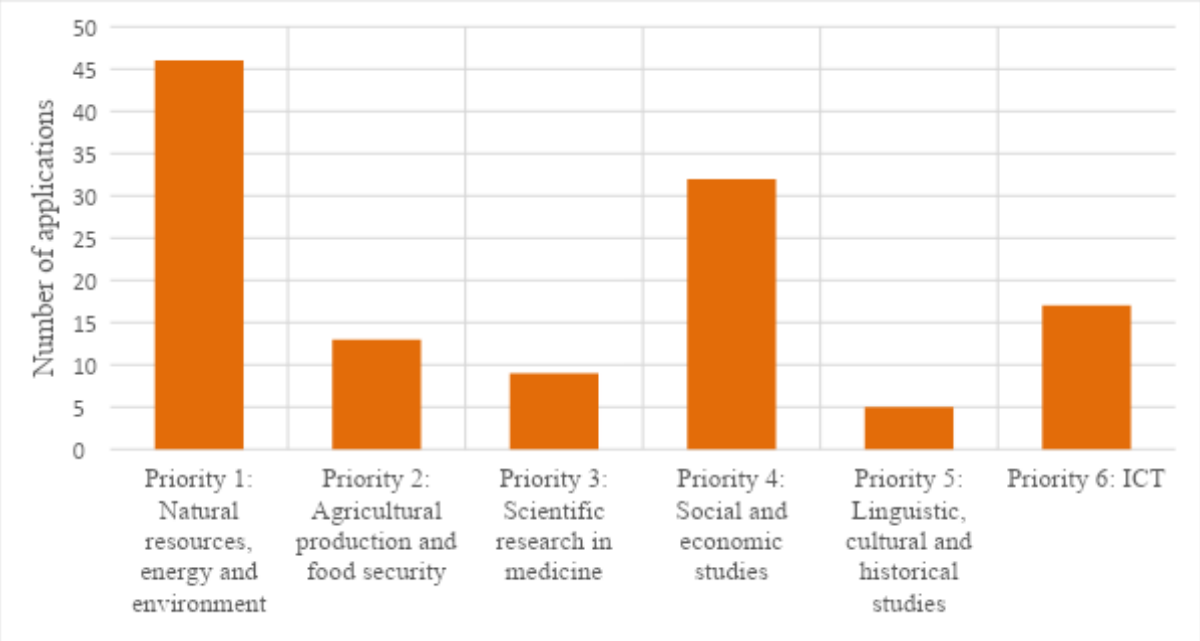


**Figure 6.** Number of applications for small scientific projects for the period 2017-2021 according to the scientific priorities defined in the National Scientific Program 2010. [MESTI, 2022].

Improving the environment for scientific research and innovation is one of MESTI's five strategic goals. From December 2021, Kosovo is an associate member of the Horizon Europe program that enables Kosovo's scientific research institutions to apply with full rights for scientific grants under this program. Kosovo is a member of the GEANT network, a network that enables access to international collaborations and scientific research infrastructure in Europe.

## 3. Vision, aim, and objectives

The vision presented in the National Science Program 2023-2028 is for the Kosovo scientific institutions to have active participation in national and international programs and to extend their contribution to Kosovo'seconomic and social development.

In this context, the main aim of this program is:

*To increase qualitative and quantitative scientific outputs at the international level and to generate innovations with an impact on the economic development of the country*.

After assessing the current state of scientific achievements and innovations in Kosovo and identifying the challenges to the development of science and innovation in Kosovo, based on the expected interaction between basic sciences, citizens, and business, the National Science Program 2023-2028 aim at six strategic objectives, the realization of which creates an effective framework for eliminating barriers to Scientific Research and Innovation (SR&I). Focusing on the current and future needs of Kosovo, this program is structured into six objectives, thefulfillment of which enables Kosovo to have an efficient system for scientific research and innovation, to have sufficient human capacities, necessary infrastructure and international partnerships.

In addition, the objectives take into account the development framework of the European Higher Education Area (EHEA) and that of the European Research Area (ERA), where policies have been developed in the field of scientific research and innovation (SR&I) as well as in the processes of internationalization of scientific research.

Objective 1: Development of an effective scientific research and innovation system

The priority in this objective is the development of a stable and supportive environment for scientific research and innovation in Kosovo, supported by a functional legal infrastructure and the advancement of culture for credible scientific research in academic, scientific, and economic institutions, including the strategy and

programs for gender equality.

Objective 2: Development and training of human capacities for scientific research activities

This objective focuses on the development of human capacities for research and innovation, as well as the development of doctoral programs with the inclusion of all groups.

Objective 3: Development of scientific research infrastructure

This objective aims to significantly increase the capacities of modern infrastructure that enables more competitive access to Horizon Europe programs and other SR&I international programs (EURO HPC, European Open Science Cloud, etc.). This will be achieved with substantial government investments as well as through partnerships with complementary institutions in the region and Europe.

Objective 4: Internationalization of scientific research activities

The internationalization of scientific research activity as the objective of this program can be achieved through a) networking of the institutions of the Republic of Kosovo under the programs Horizon Europe, COST, and the Regional Cooperation Council; b) mobility programs; c) supporting joint projects with leading global scientific institutions and d) publishing and promoting scientific output in journals and international scientific forums.

Objective 5: Relationship between science, economy, and society

This objective focuses on the creation of a network of cooperation between scientific researchers, industry and society, as well as the creation of a sustainable financial fund that will support public and private research institutions that demonstrate competitive performance with EU countries.

Objective 6. Scientific Research Excellence in specific fields

This objective has as its primary goal the establishment of the State Interdisciplinary Institute for Science & Technology as well as the establishment and advancement of centres of scientific excellence, whose performance will be evaluated according to international criteria.

For each objective, a series of measures have been identified, the fulfilment of which requires the engagement of all factors responsible for implementation. The following measures are intended to serve as a guide for achieving the objectives and purpose of the National Science Program 2023-2028.

| Objective 1. | Objective 1. Development of an effective scientific research and innovation system. | | | | |
|---|---|---|---|---|---|
| | **Measure** | **Activity** | **Competent Body** | **Implementation responsibility** | **Indicators** |
| | **1.1.**Harmonize and complete the legal frameworks related to scientific research activity. | **1.1.** Review of laws.<br>**1.1.1.** Review of the law on scientific research activity.<br>**1.1.2.** Review of the law on higher education.<br>**1.1.3.** Review of the law on innovation, transfer of knowledge and technology.<br>**1.1.4.** Review of patent law.<br>**1.1.5.** Amendment/Supplement of the finance law concerning S&R activity (VAT and procurement).<br>**1.2**. Issuance of AIderived from the changes in the aforementioned laws.<br>**1.3.** Creation of an integrated system of legal basis including the four basic laws which strengthen the role of scientific research in all HEIs/scientific research institutes.<br>**1.4.** Issuance of by-laws as well as preparation of necessary documents for evaluation, in comparative terms, of the state of scientific research and technological activity as well as the degree of NSP implementation. | MESTI, Assembly, MIET, MFLT | Universities and scientific research institutes | Approved documents; Preparation and publication of the annual report on the degree of implementation of the NSP. |
| | **1.2** Establish the State Council for Integrity, and Ethics in Scientific Research. | **1.2.1** Drafting of professional standards for ethics during scientific research, in compliance with European standards.<br>**1.2.2** Promotion of standards for integrity and ethics in scientific research and innovation and their monitoring at the state level. | MESTI | Universities and scientific research institutes | The act that includes the standards for integrity in scientific research and innovation approved; Procedures for monitoring established; Periodic report on implementation |
| | **1.3.** Increase the autonomy, accountability and transparency of research institutions and centers. | **1.3.1.** Development of quality assurance mechanisms that link the institutional operation efficiency with increased performance.<br>**1.3.2.** Active participation of all actors within the HEI/Scientific Research Institutes in proposing the most optimal solutions in terms of performance enhancement | Universities, research institutes, MESTI, MFT | Higher education institutions and research institutes, MESTI | SCORE CARD, Approved document; Assessment of institutional autonomy.. |
| | **1.4.** Set up a national information centre for scientific research activity. | **1.4.1**. Functionalization and sustainability of KRIS platform (Kosovo Research Information System).<br>**1.4.2**. Capacity development for the collection, maintenance and administration of data relevant to the licensing process of research and innovation institutions in Kosovo (within the KRIS platform).<br>**1.4.3.** Capacity development for the for the collection, maintenance and administration of data and the implementation of the National Science and Innovation Fund (within the KRIS platform) in the respective schemes as well as | MESTI | MESTI | Annual report generated by KRIS. |

| | | | | | |
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| | | other modules that focus on the repository and regulation of the innovation field. | | | |
| | **1.5.** Promote continuous research work. | **1.5.1.** Creation and support of the continuous measurement system of research performance indicators in HEI.<br>**1.5.2.** Establish research performance scores (RPS) and financial support of HEIs for best performance. | MESTI/HEI | MESTI/HEI | Evaluation of research work performance. |

| **Objective 2.** | **Objective 2. Development and training of human capacities for scientific research activity** | | | | |
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| | **Measure** | **Action** | **Competent Body** | **Implementation responsibility** | **Indicators** |
| | **2.1.** Consolidation and development of doctoral programs in HEIs | **2.1.1.** Consolidation and development of doctoral programs in HEIs in Kosovo, preferably in cooperation with established institutions of higher education and science from other countries. Doctoral programs that conclude with the granting of double degrees will have priority in financial support, for S&R infrastructure, mobility, and co-mentoring. In principle, existing doctoral programs will also be able to benefit from this opportunity.<br>**2.1.2.** Participation in international projects in which the development of joint doctoral programs with European partners and beyond is foreseen.<br>**2.1.3.** Financial support for increasing the critical mass of academic staff with the potential for coordination in scientific projects through international collaborations with the academic diaspora. | HEI, MESTI | Universities and scientific research institutes | Reports from HEI, KAA, and other institutions. |
| | **2.2.** Support of post-doctoral programs | **2.2.1.** Financial support for the participation of researchers in post-doctoral programs at centres of excellence worldwide. Preference should be given to candidates whose research leads to publications in recognized international journals.<br>2.2.2. Revising procedures for selection/advancement to academic ranks in HEIs and research institutes, giving preference to candidates with post-doctoral studies at top-ranked universities. | Universities, research institutes, MESTI | Higher education institutions and research institutes, MESTI | Reports from scientific/HEIs, MEST, and other institutions. |
| | **2.3**. Financial support of doctoral students at home and abroad. | **2.3.1.** Support for doctoral studies in the priority and deficit fields of researchers in HEIs of Kosovo, as well as support for candidates pursuing their studies in prestigious universities in the world. (top 1000 according to QS World University Ranking).<br>**2.3.2.** Full financial support for doctoral students for participation in scientific conferences as well as the publication of scientific articles in open access journals. | HEI, MESTI | HEI, MESTI | Reports from scientific/HEIs, MEST and other institutions. |

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| | 2.4. Support and development of short-term mobility programs. | **2.4.1**. Support for short-term mobility of Kosovar researchers in university and scientific research institutions of other countries.<br>**2.4.2.** Enhancing, advancing the criteria for selection/advancement procedures in academic ranks in HEIs and scientific institutions, including mobility contribution at the post-doctorate level. | HEI, MESTI | HEI, MESTI | Reports from scientific/HEIs, MEST and other institutions. |
| | 2.5. Supportmobility exchange programs for a semester or annual stay in an institution abroad. | **2.5.1**. Support for mobility exchange for one semester or annual stays of Kosovar researchers in university and scientific research institutions abroad. Such exchange should lead to joint scientific publications and strengthening of cooperation between the domestic and host institutions.<br>**2.5.2.** Review of statutes and procedures for selection/advancement in academic ranks in HEIs and scientific institutes, including mobility contribution | HEI, MESTI | HEI and research institutes, MESTI | Reports from scientific/HEIs, MEST and other institutions. |
| | 2.6. Raise the capacities and support administrative staff involved in research activities | 2.6.1. Support of the administrative staff, as a critical measure for the conducting and support of the research work. | HEI, MESTI | HEI and research institutes, MESTI | Reports from scientific/HEIs, MEST and other institutions. |

| **Objective 3.** | **Objective 3. Development of scientific research infrastructure** | | | | |
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| | **Measure** | **Action** | **Competent Body** | **Implementation responsibility** | **Indicators** |
| | 3.1. Laboratories and equipment comparable to international standards. | **3.1.1.** Establishment of the National Research Infrastructure Fund - to channel government funding for laboratories and equipment for scientific research and innovation based on justifiable needs and national science priorities.<br>**3.1.2.** Inventory and valorization of current laboratories – Mapping of the current research and innovation infrastructure in Kosovo and the creation of a public database with information on laboratory equipment and how to access research or development projects. | MESTI, HEI, SRI | MESTI, HEI, SRI | National Research Infrastructure Program; Inventory and valorization of laboratories; Infrastructure mapping for SR&I and public databases. |
| | 3.2. Promotion of Open Access to scientific journals and electronic libraries in all fields. | **3.2.1.** Support for publications in open access high ranked journals.<br>**3.2.2**. Provide access to e-libraries for all relevant institutions in Kosovo according to the scientific field. | MESTI, HEI, SRI | MESTI, HEI, SRI | No. of realized subscriptions; No. of access to electronic libraries. |
| | 3.3. Sufficient spaces for reading, studying and online communication. | **3.3.1.** Provision of online study spaces and equipment.<br>**3.3.2.** Subscription to computer hardware/software for data analysis. | MESTI, HEI, SRI | MESTI, HEI, SRI | No. of spaces set up and functional equipment. |

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| | 3.4. Open access to scientific research infrastructure for scientific researchers. | **3.4.1.** Creation of the institutional database for open access to scientific research infrastructure for researchers in Kosovo. | HEI, MESTI | HEI,MESTI | Institutional database secured. |
| | 3.5. Providing scientific infrastructure for interdisciplinary studies on environment, energy and the green deal | **3.5.1.** Establishment of the State Interdisciplinary Institute for Science and Technology that is related to Objective 6.<br>**3.5.2.** Stimulating and supporting partnerships with scientific institutions in the region and Europe to support the green transition. | MESTI/ Relevant ministries | Relevant ministries | Feasibility report for the State Interdisciplinary Institute for Science and Technology; International partnerships. |
| | **3.6**. E-infrastructure. | **3.6.1**.Provision of spaces and digital devices for data storage and management (data storage and management).<br>**3.6.2.** Creation of integrated data bank (data banking) for specific fields.<br>**3.6.3**. Raising human capacities for the storage and management of integrated data according to detailed objectives in the field of digitization (under the Objective 6.). | MESTI/ HEI | HEIs and scientific research institutes | No. spaces set up; Establishment of the data bank. |

| Objective 4. | **Objective 4. Internationalization of scientific research activity** | | | | |
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| | **Measure** | **Action** | **Competent Body** | **Implementation responsibility** | **Indicators** |
| | 4.1. Strengthening scientific research activities in international structures such as: Horizon Europe, COST, Regional Cooperation Council, etc. | **4.1.1.** Development of the framework for international scientific cooperation (Horizon Europe, MSCA, ERC, et.).<br>**4.1.2.** Development of bilateral agreements for the strengthening of SR&I activities, with a focus on strategic cooperation for both parties to the agreement. | MESTI/HEI/SRI/ MFAD | HEI, SRI | Developed framework/bilateral agreements |
| | 4.2. Cooperation programs with the academic diaspora. | **4.2.1**. Creating a database for the academic diaspora (Special module in KRIS).<br>**4.2.2**. Development of conditions and regulations for the engagement of the academic diaspora in scientific institutions in Kosovo.<br>**4.2.3.** Support the mobilities of the academic diaspora in Kosovo universities and scientific institutes.<br>**4.2.4.** Support of scientific projects in partnership with the academic diaspora, in the scientific fields identified in this National Science Program. | MESTI/HEI/SRI/MFAD | HEI/SRI | No. of involved personnel from the academic diaspora; Developed legal infrastructure; Scientific publications with co-authors from the diaspora; No. of applications to Horizon Europe and other international SR&I grants. |
| | 4.3. Establishment of the international | **4.3.1** Establishment of a special mobility fund for researchers | MESTI / HEI / SRI | MEST/ European Commission | Number of mobilities; the level of growth of mobility |

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| | mobility program in order to enhance the international profile | abroad under international programs.<br>**4.3.2** Support for international mobility for students of doctoral programs to ensure the brain drain reversal (brain return) and increase the employment opportunities of the beneficiaries.<br>**4.3.3** Support for international mobility for researchers and scientific workers engaged in universities, institutes and other institutions active in scientific research work - for the purpose of publication in high-ranked journals according to specific fields or/and the preparation of applications for grants from the program Horizon Europe and other international SR&I grants.<br>**4.3.4** Support of small 6-month scientific projects for young researchers with high potential, as a mechanism for preparing applications for grants: Horizon Europe MSC, postdoctoral, scholarship program, etc.<br>**4.3.5** Increasing funds for researcher mobility on an annual basis up to 10%.<br>**4.3.6** Encouraging researchers to apply for international mobility funds (Erasmus+, Horizon Europe, MSC, etc..) | | | funds; No. of publications with international co-authors; No. of applications to Horizon Europe and other international grants. |
| | 4.4. Enhanced participation in international research networks. | **4.4.1** Support for participation in international scientific research networks, especially in the RTD European Framework Program and COST and stimulating the staff to publish with other international institutions. | MESTI | HEI/SRI | No. of memberships and participations in international networks. |
| | 4.5. Prepare the researchers for applications to scientific projects under the Horizon Europe program and other international projects. | **4.5.1** Establishment of the Center for training and preparation of scientific and innovative project proposals at the international level (such as Horizon Europe and other international projects).<br>**4.5.2.** Creation of the support fund for the development of local expertise for applications to international projects.<br>**4.5.3.** Strengthening of National Contact Points (NCPs) for the provision of services and support for the implementation of Horizon Europe scientific grants.<br>**4.5.4.** Creation of international partnerships for applications to scientific projects. | MESTI/Training center | HEI/SRI | Center established; No. of trained researchers; No. of international partnerships. |
| | 4.6. Support for scientific publications in | **4.6.1.** Strengthen Publications Support Programs with an annual growth of 10%. | MESTI | HEI/SRI | No. of scientific publications in Q1 |

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| | Q1 and Q2 of relevant journals. | | | | and Q2 journals; Increased fund. |
| | 4.7. Encourage the implementation of joint doctoral programs with international partners "double degree", "joint degree" | **4.7.1.** Encourage HEIs to form joint international doctoral programs with leading international institutions. | HEI/AKA | HEI | No. of joint programs; No. of graduates. |

| **Objective 5.** | **Objective 5. Relationship between science, economy and society** | | | | |
|---|---|---|---|---|---|
| | **Measure** | **Action** | **Competent Body** | **Implementation responsibility** | **Indicators** |
| | **5.1.** Establish a cooperation network between HEIs and financing research institutes, industry and society. | **5.1.1.** Organize professional doctorates under the law and the needs of the country.<br>5.1.2. Strengthen the activity of industrial boards in universities and scientific research institutes. | HEI - Scientific Research Institutes. | HEI- Scientific Research Institutes together with enterprises | The performance of industries and businesses compared to countries in the region and beyond. |
| | **5.2.** Funding models and the creation of a fund for innovations. | **5.2.1.** Financing of start-ups and spin-offs, companies based on scientific research.<br>**5.2.2.** Establishing a financial support scheme for joint application between universities and industry for scientific projects.<br>**5.2.3.** Allocation of subsidies to support scientific and innovative research projects.<br>**5.2.4.** Supporting the creation of scientific and technological centers/parks. | MESTI, MIET MFT and businesses | Participants in projects | Increasing the number of participants in applications with a focus on Horizon EU, etc. |
| | **5.3.** Support public and private research institutes that demonstrate competitive performance with EU countries. | **5.3.1.** Financial support scheme for applicants who have proven successful in Horizon Europe projects with industry. | MESTI | MESTI | Increase in the number applications and absorption of funds from the EU |
| | **5.4.** Encourage the transfer of knowledge and technology, promote the practice of patenting, innovation and commercial adaptation | **5.4.1.** Establishing knowledge transfer centers.<br>**5.4.2.** Financial incentive package for the development, patenting and commercialization of patents. | MESTI, MIET, MFLT | MESTI, MIET, MFLT and enterprises | No. of patents; No. of knowledge transfer trainings |

| Objective 6. | Objective 6. Scientific research excellence in specific fields | | | | |
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| | **Measure** | **Action** | **Competent Body** | **Implementation responsibility** | **Indicators** |
| | **6.1**. Establishment of the State Interdisciplinary Institute for Science and Technology of Kosovo as a center of scientific excellence comparable to international criteria. | **6.1.1.** Establishment of the State Interdisciplinary Institute for Science and Technology.<br>**6.1.2.** Set up laboratories for interdisciplinary studies with advanced equipment with a defined and harmonized strategy with the priority areas within the institute.<br>**6.1.3.** Providing funds for the scientific research that will be carried out in this institute. | Government/MESTI | MESTI | Establishment and operationalization of the institute. |
| | **6.2.** Stimulating centers of excellence and encouraging their growth. | **6.2.1.** High-performance equipment (computer, analytical equipment).<br>**6.2.2.** Employment of full-time professional staff<br>**6.2.3.** Creating legal opportunities for sustainable operation.<br>**6.2.4.** Provision of trainings for raising professional and administrative capacities.<br>**6.2.5.** Enhance applied research and innovation. | HEI, MESTI, Scientific research institutes, etc. | HEI, MESTI, Scientific research institutes, etc. | Establishment of centers; No. of young workers; No. of training provided and the number of innovative activities offered by the centers. |
| | **6.3.** Support of core and interdisciplinary disciplines | **6.3.1** Set up interdisciplinary programs.<br>**6.3.2.** Establish a financial support scheme for scientific research and innovation. Core disciplines and interdisciplinary.<br>**6.3.3.** Raising infrastructural capacities for scientific research and innovation related to the priority areas of NSP 2023. | HEI, MESTI, relevant ministries | Participants in the programs | Increase in the number of participants in applications with a focus on Horizon EU, etc. |
| | **6.4.** Implementation of the Outstanding Achievement Award | **6.4.1**. Financial support scheme for applicants who demonstrate outstanding and innovative achievements and results within the core areas. | MESTI | MESTI | Increase in the number of applications. |
| | **6.5.** Building mechanisms for monitoring and evaluation | **6.5.1**. Financial support for training and expertise that support monitoring and evaluation mechanisms. | MESTI, KAA, HEI, Institutes | MESTI, MIET, FLTand businesses | No. of institutes; No. of trainings |

# 4. Development of the priorities of the National Science Council in Kosovo

## 4.1. Rationale for establishing priority areas

The process of setting priorities in the National Science Program is based, in the first place, on the priority areas of the previous national science program whose up-to-date is still relevant. Also, the current strategies of the country's development in certain sectors, such as the National Development Strategy 2030 and the quantitative analysis report[17] of the preliminary priority areas in the framework of the preparation of the Smart Specializations Strategy, were taken as a basis. The support for these priority areas was drawn as a finding also in the context of the debate that the NSC organized with stakeholders in May 2022. The priority areas that have been proposed are also comparable to the priorities of the Horizon Europe program. The adaptation of the priority areas of the country to those of the EU countries will enable the increase of the participation of the country's scientists in scientific projects within the Horizon and at the same time will help to adapt the country's legal framework to EU legislation. The last step also serves to prepare the country to more easily fulfill part of the conditions to apply for membership within the EU. Therefore, based on the arguments given above, four priority areas were proposed (Health; Society - education, culture, economy and humanities and social sciences; Natural resources, energy, environment and climate change; Agricultural production, food and bioeconomy) and two horizontal cross-cutting areas (Green Deal and Digitization), Figure 7.

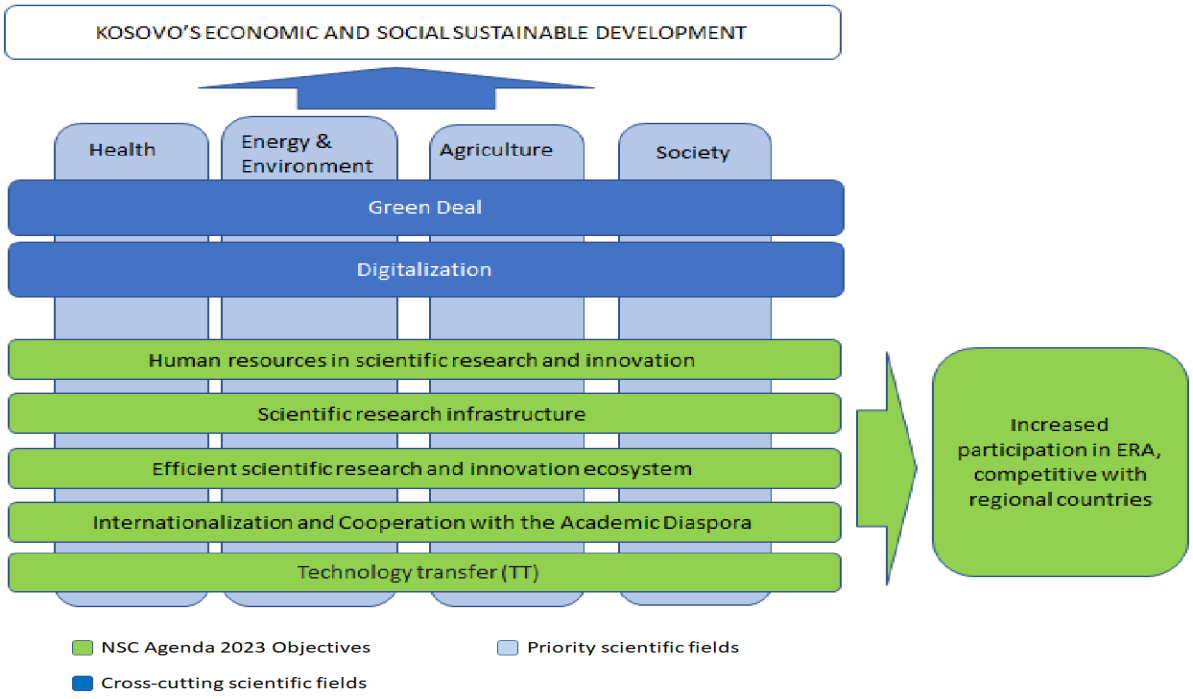


**Figure 7**. Priority areas of the NSP.

A broad analysis of the main challenges within each priority area is presented below.

[17] JRC, Report on the quantitative analysis of preliminary priority areas in the framework of the preparation of the Smart Specialization Strategy of the Republic of Kosovo, 2022

## 4.2. Priority 1: Health

### 4.2.1. Background and framework

Kosovo's health system has been under constant reform since 1999. Despite Kosovo's intention to implement policies that are in line with EU health policies, their implementation remains partial or unassessed. Post-war health strategies mainly focused on the following objectives: development and implementation of the legal framework in healthcare, investment and improvement in health infrastructure including medical equipment in line with EU standards, development of family medicine services, decentralization of primary healthcare services at municipal levels, development of professional health service management systems, development of the health information system, development of a sustainable health service financing system including health insurance. The document "Health Sector Strategy for the period 2017-2021"[18] has three objectives: 1. Protection and advancement of health; 2. Sustainable health funding, and 3. Reorganization of the health sector. Besides these challenges, Kosovo still suffers from the lack of provision of quality healthcare services and unequal access to certain healthcare services. Moreover, Kosovo is recently being faced with loss of qualified health staff, mainly due to their departure to EU countries, which may further exacerbate the situation. With the COVID-19 pandemic, Kosovo like other countries has been challenged by exposing the healthcare system's weaknesses both in terms of capacities for human resources and infrastructure.

As in other countries, the main causes of mortality in Kosovo are cardiovascular, malignant, and diseases caused by external causes. Many are related to environmental degradation, pollution, loss of biodiversity, diseases transmitted by animals (zoonoses), and climate change.

One of the potential healthcare research strategies in Kosovo should be to follow the logic of the strategy of the European Commission, elaborated in the document Horizon Europe Strategic Plan 2021-2024[19]. Special emphasis should be given to the use of digital methods as well as research and innovation based on the digital collection and dissemination of data. The digital healthcare transformation is expected to have a positive impact on the health of citizens and the health economy.

EU is making efforts to support EU member states to develop innovative health and healthcare-related technologies. The vision is to establish an ecosystem where citizens can rely on effective healthcare services that address their health needs while being assisted in improving their healthcare and preventing various diseases.

The EU4HEALTH program aims to support the EU to continue to be the healthiest region in the world, by taking measures that address health challenges at national and EU levels, including new healthcare risks and threats.

To achieve the maximum impact on public health, Horizon Europe and EU4Health aim to maximize synergy - Horizon Europe will focus on generating the *know-how*, while the EU4Health program will focus on the maximum use of this know-how knowledge for general healthcare and wellbeing.

Europe's Beating Cancer Action Plan, as part of Horizon Europe's Mission on Cancer project and funded by EU4Health will support member states in improving measures for the prevention, control, and treatment of cancer. Kosovo has received the invitation to nominate working groups for EU missions within the Strategic Configuration of the Horizon Europe Program Committee for the cancer mission. Also, Kosovo is a member and signatory of the SEEIIST (South East European International Institute for Sustainable Technologies) project. The project aims to establish the "hadron therapy" cancer centre with protons and biomedical research in one of the member states of the project. Kosovo has its own representative in the steering committee and is expected to have a representative in the SEEIIST association as well.

The COVID-19 crisis emphasized the importance of cooperation and coordination among EU member states in prevention, efficient action, and limiting the spread of epidemics across state borders.

Part of the Green Deal program is the adoption of the "One Health" approach to address the impact of factors such as environmental degradation, pollution, loss of biodiversity, animal-transmitted diseases (zoonoses),

[18] https://msh.rks-gov.net/wp-content/uploads/2013/11/MSH_STRATEGJIA_raport_alb-web.pdf

[19] https://www.eeas.europa.eu/sites/default/files/horizon_europe_strategic_plan_2021-2024.pdf

and climate changes on the health of people and healthcare systems.Utilizing the full potential of digital methods as well as research and innovation oriented around digital data collection will be key for Kosovo's entry into the digital age. This will affect the digital healthcare transformation and personalized healthcare services by significantly affecting health and health economy. Community service providers must recognize, support and implement recommendations and innovative solutions to achieve the desired impact.

In order to maximize the benefit of EU investments and support, efforts should be made to coordinate healthcare service programs and policies at the national level with EU programs and policies.

#### 4.2.2. Expected impacts of priority 1 and it's cross priority complementarities

- Health and well-being in a changing society

People of all ages should enjoy good health despite constant and rapid social changes. This means adopting a healthy lifestyle focusing on the "healthy individual" through physical activity, a healthy diet, a healthy environment, evidence-based health policies, and effective solutions for health promotion and disease prevention. The development strategy of the Government of Kosovo considers physical activity and healthy diet as priorities.

Research and innovation should serve for defining specific needs in relation to healthcare, including specific requirements for certain age groups, and gender, as well as specific requirements for vulnerable groups. BI (Behavioural Insights) research with the COMB (Capability, Opportunity, Motivation, Behaviour) methodological approach may have a significant impact in this area.

Research and innovation should develop more effective solutions for health promotion and primary, secondary, tertiary, and quaternary disease prevention, including identifying needs for chronic diseases, physical disabilities, mental disorders, and disabilities or other disorders related to certain age groups.

Furthermore, research and innovation can provide new evidence and methods for advancing health education by empowering citizens to manage their health.

- Living and working in a healthy environment

A healthy living and working environment is ensured by more knowledge on the environmental, workplace, social, and economic factors that have an impact on health.

Research and innovation should provide new evidence, methodologies, and tools to understand, identify and assess the risks and benefits of various environmental factors on human health and create conditions for undertaking certain measures related to healthcare promotion and disease prevention. The triangle[20]"Decision Makers", "Professionals (health and non-health)", and "Individual, Family and Community" is an important model for the application of studies in this area.

These should be in coordination with the EU's environmental and health policies, such as the European Green Deal, 8th Environment Action Program, EU Strategic Framework on Health and Safety at Work, and European Environment and Health Process (EHP)[21]. Close cooperation between other priorities of this document related to issues such as the agriculture, food, environment, climate, mobility, security, urban planning, and social and gender inclusion, is necessary to achieve the maximum impact in society. Also, international cooperation will be necessary to advance research and innovation in addressing this challenge.

- Reducing the disease burden

Health service providers must be able to manage diseases such as contagious diseases, diseases related to poverty and neglect, as well as rare non-communicable diseases. Proper knowledge of such diseases, their treatment through effective and innovative health methods and technologies, as well as better preparation in terms of management, effectively reduces the burden on people and the health system. Antimicrobial resistance and hospital-acquired infections are issues that need to be addressed in this area.

[20] O'Brien GL, Sinnott SJ, O' Flynn B, Walshe V, Mulcahy M, Byrne S. Out of pocket or out of control: A qualitative analysis of healthcare professional stakeholder involvement in pharmaceutical policy change in Ireland. Health Policy. 2020 Apr;124(4):411-418. doi: 10.1016/j.healthpol.2020.02.011. Epub 2020 Feb 28. PMID: 32139171.

[21] EC, Horizon Europe Action Plan 2021-2024. https://www.eeas.europa.eu/sites/default/files/horizon_europe_strategic_plan_2021-2024.pdf

Research and innovation should be oriented towards new measures of prevention and early and accurate diagnosis of diseases, the safe application of vaccines and pharmacological and non-pharmacological therapies, the application of new antibiotics, alternatives to antibiotics, the application of digital solutions in healthcare as well as improvement of existing strategies.The advancement of research and innovation in this area is realized through international cooperation to achieve the best possible expertise. Access to the most modern research infrastructures, international collaborations, provision of funds and investments in priority needs serve the health security.

- Innovative, sustainable and high-quality healthcare

Healthcare provides safe, high-quality, and cost-effective solutions in the service of the population's health. Research and innovation should be oriented towards the development of solutions in all different healthcare dimensions, including aspects such as healthcare policies, management, financing, preparedness for health emergencies, climate changes, education and training of healthcare staff, sustainability of health services and communication with the patient. Also, research and innovation should provide decision-makers with new evidence, methods and tools for the successful implementation of these solutions at different healthcare levels.

- Digitization for a healthy society

Health technologies, new devices and digital solutions must be applied effectively, safely and ethically in healthcare. Research and innovation should be oriented towards the development of new tools and technologies for biomedical research, prevention, diagnosis, treatment and monitoring. In order to provide quality health care and reduce health disparity, cross-sectoral collaboration is needed involving patients, health service providers, researchers, regulatory bodies, policy makers and foundations. Artificial intelligence technologies have shown great promise for analyzing large amounts of health data, supporting clinical decision-making, advancing biomedical research, personalized medicine, and supporting health care systems in their organizational and logistical functions.

- Innovative, sustainable and competitive health industry

Research and innovation should be oriented towards the development of cross-sectoral business models in which the health industry collaborates with health care systems in the development of new products and services to provide useful solutions for health care services and reduction of health care expenditures per capita. The expected impacts and the impact of the priority area Health on other priority areas are presented in the following Tables 1 and

Table 1. Overview of expected impacts of intervention areas and scientific research activities

| **Priority 1. Health** | | | |
|---|---|---|---|
| **Expected impacts** | **Areas of intervention and priority scientific research activities** | **Implementation responsibility*** | **Funding provision**** |
| **Health and well-being in a changing society** | • Definition of specific needs related to health care, including specific requirements for certain age groups, genders, as well as specific requirements of vulnerable groups;<br>• More effective solutions for health promotion and disease prevention, including the identification of needs for chronic diseases, physical disabilities, mental disorders and disabilities or other disorders related to certain age groups;<br>• Providing evidence and new methods for advancing health education by empowering citizens to manage their own health. | MoH/HEI/SRI | GK/IC |
| **Life and work in a healthy environment** | • Acquire new evidence, methodologies and tools to understand, identify and evaluate the risks and benefits of various environmental factors in human health;<br>• Creation of conditions for undertaking certain measures related to health promotion and disease prevention. | MoH/HEI/SRI | GK/IC |
| **Reducing the disease burden** | • New measures of prevention, diagnosis, application of vaccines and pharmacological and non-pharmacological therapies, of new antibiotics, of alternatives to antibiotics, as well as the improvement of existing strategies. International cooperation in order to realize the best possible expertise;<br>• Access to the most modern research infrastructures, international collaborations, securing funds and investments in priority needs in the service of health security. | MoH/HEI/SRI | GK/IC |
| **Innovative, sustainable and high-quality healthcare** | • Review of health policies related to management, financing, preparedness for health emergencies and climate change;<br>• Education and training of health staff. Ensuring sustainability of health services and communication with the patient;<br>• Acquire new evidence, methods and tools, ways of successful implementation of these solutions at different levels of health care. | MoH/HEI/SRI | GK/IC |
| **Digitization for a healthy society** | • Development of new tools and technologies for biomedical research, prevention, diagnosis, treatment and monitoring;<br>• Cross-sectoral collaboration involving patients, health service providers, researchers, regulatory bodies, policy makers and foundations;<br>• Application of artificial intelligence technologies for the analysis of large amounts of health data, for the advancement of biomedical research, personalized medicine and for the support of health care systems in their organizational and logistical functions. | MoH/HEI/SRI | GK/IC |
| **Innovative, sustainable and competitive healthcare industry** | • Development of cross-sectoral business models in which the health industry collaborates with health care systems in developing new products and services so that these provide useful solutions in the service of patient care and reduction of health care costs per capita. | MH/HEI/SRI/Industry | GK/IC |

*MoH = Ministry of Health; HEI = Higher Education Institutions; SRI= Scientific Research Institutes; Industry = various corporations: ** GK = Government of Kosovo; IC = International cooperation.

Table 2. Overview of cross-priority and cross-sectoral complementarities

| **Priority 1. Health** | |
|---|---|
| **Priority** | **Relevant expected priority impact** |
| 2. Society, education, culture, economy and social sciences and humanities | ● Raising awareness about health care, including specific requirements for certain age groups, genders, as well as specific requirements of vulnerable groups. Evidence and new methods are obtained for the advancement of health education, empowering citizens to manage their health;<br>● Providing scientific data on certain measures for health promotion and disease prevention;<br>● Provision of scientific data for diagnostic measures, application of vaccines and pharmacological and non-pharmacological therapies;<br>● Providing up-to-date scientific data in order to raise awareness about health emergencies and climate change;<br>● Raising awareness and developing curricula on new tools and technologies, including artificial intelligence in the service of the health of population;<br>● Conducting activities involving patients, health service providers, researchers, regulatory bodies, policy makers and foundations;<br>● Raising awareness of personalized medicine;<br>● Development of cross-sectoral models in which society, education, culture, social sciences and humanities collaborate with health care systems in the development of new products, services in the service of patient care and in the reduction of health care costs per capita. |
| 3. Natural resources, energy, environment and climate change | ● Providing important scientific data in order to prevent diseases related to the environment;<br>● Identification of environmental factors of chronic diseases, physical disabilities, disorders and mental disabilities or other disorders in certain age groups, genders and professions;<br>● Identification and assessment of risks and benefits from various environmental factors in human health.<br>● Providing up-to-date scientific data for the review of health policies related to management, financing, preparedness for health emergencies and climate change;<br>● Application of new biomedical tools and technologies for assessing the benefits of natural resources, energy, the environment and climate change in the health of the population;<br>● Development of cross-sector business models in which the energy industry collaborates with healthcare systems to provide beneficial solutions in the service of patient care and reduction of healthcare costs per capita. |
| 4. Agricultural production, food and bioeconomy | ● Providing effective solutions for health promotion in rural and urban environments through the identification of healthy foods, healthy eating and life practices for a healthy life;<br>● Identification and evaluation of risks and benefits from different factors related to types of food, amount of consumption, cultivation and processing method;<br>● Provision of scientific data related to non-pharmacological forms of care for the health of the population;<br>● Development of cross-sector business models in which the food industry collaborates with healthcare systems in product development to provide beneficial solutions for patient care and reduce per capita costs. |
| **Intersectoral priority** | **Relevant impact of priority** |
| 5. Green Deal | ● Assisting in the implementation of the Multidisciplinary Competency Framework for Climate Change. |
| 6. Digitization | ● Provision of effective and integrated digital data management system;<br>● Development, implementation and maintenance of innovative digital technology and mobile technology with impact in addressing challenges for sustainable health development;<br>● Application of new biomedical tools and technologies for evaluating the benefits and risks of various factors related to the types of food, the amount of consumption, the way of cultivation and processing. |

## 4. 3. Priority 2: Society - Education, culture, economy and social sciences & humanities

### 4.3.1. Background and framework

Due to a wide spectrum of scientific disciplines that are included in the social component, for pragmatic purposes a division has been made into certain fields divided according to the fields of study by Erasmus. Five areas are involved in this priority, which includes studies in the field of education, culture, economy, social sciences and humanities.

- Education

All the pillars of economic, cultural, social, artistic and scientific development are built on education. Therefore, research in the field of education has an impact on educational practices, creative and expressive processes, as a result, they affect social well-being, the quality of life and the construction of a democratic society. Given that education in Kosovo has gone through a complex and difficult process, the challenges are numerous and immediate. Curricular studies, methodologies of teaching, learning, assessment, education and professional training practices of teachers, as well as management practices of educational institutions should be encouraged. Researches of an applied nature in these fields can influence the improvement and further development of the education sector.

Kosovo Draft Education Strategy 2022-2026[22] has 5 objectives that focus on improving the quality of early childhood education, pre-university education, vocational training, adult education and digitalization of education. Studies in the field of education should also be in function of achieving the objectives of this strategy, as well as the goals of the Curricular Framework for Pre-university Education, and many other strategic documents and legal acts that coincide with the field of education. Studies of educational sciences and other disciplines should help in evaluating existing educational policies and practices as well as recommending new ones through piloting and evaluating new practices, which can be converted into national practices. Studies in this field must be practical and ensure the conversion of results into improvement and increase in the quality of education in Kosovo, including all actors in the educational process. In addition to the contribution to learning and the fields mentioned, studies in this field also contribute to the physical, social and psychological well-being of the beneficiaries and providers of educational services in the country.

- Culture

Since early antiquity, Kosovo is proven in history through its characteristics and identity, as a country with a complex history inheriting nowadays a cultural heritage still to be revealed. Not only the loss of 1247 artifacts that are unjustly held by Serbia but also the lack of investment and organized scientific work in the past has made this sector need programmatic planning of scientific research, for its heritages to be revealed and promoted. The culture in the country presents a rich and unique mosaic of the region and is beyond worth studying. NSP supports scientific research related to the area of art and design, music and musicology, museology, photography, cinematography, art history, and performing arts. Scientific research on cultural heritage added value according to the crossover effect, which corresponds to the economic models of the creative cultural industries. Because of its complex nature, culture requires thoughtful action strategies that promote scientific research focusing on an applied approach. Research, innovation, promotion of cultural knowledge, and organic understanding of cultural heritage provide extraordinary opportunities for long-term innovative strategies (digitalization) and interpretation, evaluation, conservation, future transmission, education, and generation of new cultural forms.

Therefore, in this area, multi- and interdisciplinary research is a condition to activate the mechanisms that produce economic and social value for a wide and heterogeneous network. It is therefore important to create technological clusters open to public/private interaction that attract stakeholders, based on Horizon Europe's approach to 'Cultural Heritage'. The intervention area for Kosovo represents a multidisciplinary and multisectoral community from the human sciences (history, art, philology, literary science, philosophy, archaeology anthropology), digitalized heritage (3D reconstructions, immersive realities, etc.) to heritage science (nanomaterials and reconstruction and restoration technology, etc.).

[22] MESTI, 2022. https://konsultimet.rks-gov.net/Storage/Consultations/14-54-14-17062022/1.-Draft-Strategjia-e-Arsimit-2022-2026. https://konsultimet.rks-gov.net/Storage/Consultations/14-54-14-17062022/1.-Draft-Strategjia-e-Arsimit-2022-2026-Sq.docx

- Economy

Currently, science and research have a multiple role in society because in addition to the contribution in terms of education, they also have an important role in the economic aspect and the labour market. According to the Lisbon Strategy - Europe 2020, there must be a connection between the economy and research, in order to create opportunities not only for the labour market but also for the growth of innovations in the economy, the growth of production and exports. Also, based on the report of the European Commission of 2000, during the year 2000 about 22% of jobs required high qualifications based on higher education, while 29% required low level qualifications. Based on the latest trends in 2020, about 35% of jobs require high qualifications based on education and research, therefore the institutions in Kosovo should also be based on these developments. In the macroeconomic aspect, the Institutions of Kosovo should be focused on addressing the comparative advantages at the national level, so that the focus of financial investments, respectively the budget, are directed to the support of comparative advantages, specialization based on comparative advantages, and export of products and services with added value. Also, in order to ensure a stable financial support, there should be a continuous institutional commitment in the absorption of EU projects, mainly Erasmus+ and Horizon Europe, not only by HEIs, but also by businesses in Kosovo. Businesses in Kosovo, in order to increase their competitive abilities and to ensure access to EU markets, must definitely create partnerships with HEIs in Kosovo, the region and the EU, because a partnership especially with the EU creates not only financial opportunities, but also experience, partnership and enhancement of "corporate governance".

- Humanities

Linguistics, history, literary science, folkloristics, ethnology, also known as leading humanities disciplines in Kosovo, have a consolidated heritage in the studies known as Albanology or Albanistic studies. New cultural trends, social movements and technological achievements, in addition to the need for follow-up, research and study of cultural phenomena, confronts them with the need for methodological adaptation and refreshment, encouraging the interdisciplinary, multidisciplinary and transdisciplinary approach. Also, the consolidated diaspora but also the subsequent migrations, influence the creation of new identities, which require involvement in the research and study of cultural and subcultural phenomena, in Kosovo and abroad.

Meanwhile, we have a modest amount of studies on antiquity, archaeology, historical-epigraphical studies, classical philology, etc. Disciplines on antiquity reconstruct the sociocultural development of the ancient world and bring ever deeper knowledge on the core aspects of life with cultural, socio-political and economic impact. Since Kosovo represents a productive environment in this aspect, research in the field of classical studies as a field for intervention, also based on Horizon Europe, requires greater support for consolidation and development. The digitization and promotion of artifacts, archives, libraries and the introduction of new digital techniques is a necessity for the development of these fields.

- Social sciences

Since the object of social sciences is the explanation of complex social phenomena, studies from this field should be an integral part of the other priorities mentioned in this document. Providing solutions to problems in the fields of information technology, energy and other priority areas in this document requires research in terms of the social implications of these solutions, the acceptability of the solutions offered, the implications for changes in behaviour and their applicability in the Kosovar context. In addition to the connection with other priorities, social sciences through research should assist in the implementation and evaluation of local strategies that address complex phenomena such as migration (Strategy on Migration 2021-2025), prevention of any type of violence (National Strategy for protection from domestic violence and violence against women) and other relevant sectoral strategies in the country. Studies in this direction can contribute to the recommendation and development of policies and the establishment of institutional frameworks that further expand political participation, social dialogue, accountability, and civic engagement, including gender equality, and help fight against any type of discrimination and inequalities in society.

4.3.2. Expected impacts of priority 2 and cross-priority complementarities

- Increasing quality in education

Through research into the improvement and advancement of leadership and policies in education, teacher education, professional training, curricula, textbooks, inspection, teaching, and learning, the improvement of the results of pupils, and students at all levels of education will be affected.

- Preservation and evaluation of cultural heritage

With the fundamental mission of research in the humanities, which has as a constant activity the interpretation and re-interpretation of material and non-material, mobile and non-mobile, digital and digitizable wealth, there will be affected the increase of awareness for interdisciplinary research that knows how to evaluate the contribution of knowledge of humanities in the definition of cultural identity in our country in relation to the European context; and contribute to the construction of open databases for scientific research.

- Strengthening cohesion, solidarity, and social integration

Through the improvement of social dialogue and intercultural and interethnic exchanges and through civic awareness, the challenges of social inequalities must be addressed. In this direction, systematic studies of social and cultural processes must be advanced to better understand the causes and consequences of human actions and behaviours in the country's strategic sectors. Furthermore, the advancement of social sciences and humanities is strengthened with an emphasis on multi- and interdisciplinary as well as transdisciplinary critical research of culture, including traditional, current, intercultural and other aspects and particularities.

- Strengthening democratic governance

Improving horizontal and vertical communication ways, accountability, transparency, effectiveness and reliability of institutions and policies based on the rule of law should influence the strengthening of democratic governance. Through studies in the disciplines of social sciences and through the empowerment of active and inclusive citizenship, the aim is to increase the responsibility to protect basic human rights, to protect the environment, to contribute to sustainable economic, social and cultural development, and to advance critical reflection towards problems of social inequalities.

- Advancement of effective communication

Effective communication based on mutual respect in all public spheres of society, through the advancement of linguistic and cultural shaping in formal educational institutions and the fair application of communication at all levels and political and social structures will influence the growth of civic awareness for taking individual responsibility for addressing collective challenges in Kosovar society and beyond. The expected impacts and impact of the priority area society - education, culture, economy and humanities and social sciences on other priority areas is presented in the following Tables 3. and 4.

Table 3. Overview of expected impacts, areas of intervention and scientific research activities

| **Priority 2. Society - Education, culture, economy and social sciences & humanities** | | | |
|---|---|---|---|
| **Expected impacts** | **Areas of intervention and priority scientific research activities** | **Implementation responsibility*** | **Funding provision**** |
| **Increasing quality in education** | ● Encouraging research that affects the increase in performance in teaching and the promotion of curiosity and interest in learning;<br>● Promotion of studies in educational sciences that help in evaluating and revising existing educational policies and practices as well as recommending new policies and practices, which can be converted into national practices. | HEI, MESTI<br>Research institutions | GK/IC |
| **Preservation and evaluation of cultural heritage** | ● Encouraging research on the interpretation and reinterpretation of material and immaterial, movable and immovable, digital and digitizable assets;<br>● Interdisciplinary research that evaluates the contribution of humanities knowledge in the definition of cultural identity in our country in relation to the European context;<br>● Research in the field of art and design, music and musicology, photography, cinematography, art history and performing arts; innovative cultural research that provides opportunities for interpretation, evaluation, conservation, education, and the creation of new cultural forms. | MCYS/MESTI/ HEI | GK/IC |
| **Strengthening cohesion, solidarity and social integration** | ● Research about social dialogue and intercultural exchanges through civic awareness to address the challenges of social inequalities.<br>● Systematic research of social and cultural processes to better understand the causes and consequences of human actions and behaviours in the country's strategic sectors;<br>● Multi-interdisciplinary and trans-disciplinary critical research of culture, including traditional, popular, every day and other aspects and particularities;<br>● Critical interdisciplinary research that advances the humanities and social sciences. Critical research in humanities disciplines such as linguistics, history, literary science, folkloristics, ethnology, anthropology that advance social and cultural cohesion and integration through an interdisciplinary, multidisciplinary and transdisciplinary approach;<br>● Researching issues related to diaspora and new migrations, focusing on the study of cultural and subcultural phenomena that result from the creation of new identities.;<br>● Research on antiquity that brings fundamental knowledge of life with cultural, socio-political and economic impact;<br>● Research on the digitization and promotion of artefacts, archives, libraries and the introduction of new digital techniques. | HEI,<br>MESTI, MCYS/Relevant ministries and institutions | GK/IC |
| **Strengthening democratic governance** | ● Research that promotes active and inclusive citizenship with the aim of protecting basic human rights;<br>● Research that advances vertical and horizontal communication, accountability, transparency, effectiveness and reliability in institutions and policies based on the rule of law;<br>● Interdisciplinary research in the fields of social sciences that contribute to sustainable economic, social and cultural development; research that advances critical reflection on the issues of social inequalities;<br>● Research that addresses the prevention of any type of violence in society; research that contributes to the development of policies and institutional frameworks that further expand political participation, social dialogue, accountability, civic engagement, including gender equality that help fight against all kinds of discrimination and inequalities in society. | Schools/HEI/MESTI/<br>Public institutions | GK/IC |

| Priority 2. Society - Education, culture, economy and social sciences & humanities | | | |
|---|---|---|---|
| **Expected impacts** | **Areas of intervention and priority scientific research activities** | **Implementation responsibility*** | **Funding provision**** |
| **Advancement of effective communication** | • Research that develops and advances effective communication based on mutual respect in all public spheres of society through the advancement of linguistic and cultural shaping in educational institutions;<br>• Research that addresses the prevention of verbal and physical violence in public institutions by applying effective communication strategies;<br>• Research that increases citizen awareness for taking individual responsibility for addressing collective challenges in Kosovar society and beyond. | Schools/HEI/MESTI/ Public institutions | GK/IC |

* HEI = Higher Education Institutions; SRI= Scientific Research Institutes; Industry = Various corporations: ** GK= Government of Kosovo; IC = International Cooperation.

Table 4. General description of cross-priority and cross-sectoral complementarities.

| Priority 2. Society - Education, culture, economy and social sciences & humanities | |
|---|---|
| **Priority** | **Relevant expected priority impact** |
| 1. Health | • Increasing awareness of health and the importance of health at different stages of physical, intellectual and emotional development through formal and informal education;<br>• Improving physical and mental health and well-being through educational, cultural, and social programs;<br>• Cultivating individual and collective responsibility for public health. |
| 3. Natural resources, energy, environment and climate change | • Increased awareness of efficient and sustainable use of natural resources;<br>• Cultivating individual and collective responsibility to contribute to the protection of natural resources, the environment, energy efficiency, and climate change at the local and global level;<br>• Encouraging the promotion of scientific research on environmental cultural heritage, alongside such cultural research in areas undergoing climate and energy changes. |
| 4. Agricultural production, food and bioeconomy | • Advancing agricultural production through educational programs that contribute to food safety and security at the country level;<br>• Promotion of healthy eating and its role in preserving food and health and physical and mental well-being;<br>• Increasing awareness about healthy eating and its impacts on the use of agricultural resources;<br>• Scientific research on the heritage cultures of gastronomy, cuisine, way of eating, etc. |
| **Intersectoral priority** | **Relevant impact of priority** |
| 5. Green Deal | • Increasing individual and collective awareness and responsibility for the importance and role of the Green Deal in the local and global context;<br>• Assisting the Multidisciplinary Competency Framework for climate change. |
| 6. Digitization | • Ensuring effective and integrated digital data management system in the fields related to priority 2;<br>• Development of new innovative digital technologies with an impact on the management and performance of areas related to priority 2. |

## 4.4. Priority 3. Natural resources, energy, environment and climate change

### 4.4.1. Background and framework

- Natural resources

Kosovo is rich in various natural resources of mineral origin. Lead, zinc and nickel stand out among the metallic minerals, but they are not extracted and processed on a large scale due to various problems in the operation of the mines of Trepça, Ferronickel, etc.[23]Based on the data on Kosovo's trade exchanges that are provided in the Kosovo National Development Strategy 2030, it is shown that the base metals nickel, zinc, lead and other minerals, which are basically raw products and are generally considered to have low added value, account for up to 47% of all exports of goods. [24]

In the mining strategy of Kosovo 2012-2025, among others, institutional and human resources development are foreseen, as well as large-scale geological research of current resources and the search for new mining resources. In the current context of energy issues and the war in Ukraine, the rational and efficient use of mining assets is necessary because they are strategic assets.

Land resources - agricultural lands make up about 38.5% of the land surface of the territory of the Republic of Kosovo, forest land 44.0%, while other surfaces are built-up areas and water. [25] The production of quality and sufficient food at the country level is a big challenge for the agricultural sector, therefore it is necessary that, in addition to the rational use of usable land surfaces, a lot of work should also be done on the regeneration of contaminated soils as a result of human activities.

Kosovo has underground water resources that are present in its western part as well as surface water resources that are mostly found in the eastern part of the country. The country does not have an efficient consolidated network for the use of water for drinking as well as for irrigation, except for the "Ibër-Lepenc" system, which is also used by the Kosova A and B power plants.

- Energy

The energy system in Kosovo is composed of the combined primary supply of various conventional energy sources, which is mainly based on coal, oil products, biomass (including wood); the electricity production sector and the electricity distribution sector. Electricity production is based for the most part on the exploitation of lignite reserves and a minor share of electricity produced by renewable water, solar and wind sources. From the data recorded by the relevant authority reflected in the energy balance, 50% of the energy supplied to the energy system has been converted into useful forms (electricity, mobility, high and low temperature thermal energy in industry and buildings, etc.) and has been used to meet energy requirements in various sectors (heating, cooling, electricity, industry, transport, agriculture and other sectors). Currently, coal is the main fuel used for the production of electricity in Kosovo, concentrated entirely in the TC Kosova A and B thermal power plants. The electric power system of Kosovo has a total installed capacity for electricity production of about 1,513 MW, with an operating capacity of about 1,180 MW net. [26]Renewable energy sources (RES), which include hydropower plants, wind farms and solar photovoltaic panels, currently contribute about 230 MW, according to data from the Energy Regulatory Office (ERO). An important place in this production is occupied by the wind energy park installed in Shala of Bajgora with a maximum production capacity of 105 MW.

According to the EU strategy for reducing the effects of global warming, a zero balance of carbon dioxide emissions is foreseen by 2050.[27]This approach has been reinforced with the adoption of the Green Deal in

[23] Government of Kosovo, Mining Strategy of Kosovo 2012-2025.

[24] Kosovo Agency of Statistics 2020.

[25]MAFRD, 2022.Strategy for agriculture and rural development 2022 - 2028. https://www.mbpzhr-ks.net/repository/docs/STRATEGJIA_20222028_FINAL_ALB_Web_Noprint_me_04.07.2022.pdf

[26]ASAK 2020, Report on electricity production in Kosovo. https://ashak.org/botime/raporti-per-prodhimin-e-energjise-elektrike-ne-kosove-2/

[27] European Commission. A Clean Planet for all A European Strategic Long-Term Vision for a Prosperous, Modern, Competitive and Climate Neutral Economy; European Commission COM (2018) 773 final: Brussels, Belgium, 2018

2021.[28] Within this agreement, it is envisaged to reduce up to 55% emission of greenhouse gases by 2030, while the contribution of RES to the total energy consumption is predicted to be up to 40%. In the second stage by 2040, the contribution of RES is intended to be 100%.

To adapt the above objectives in the energy sector in the Republic of Kosovo, the contribution of scientific research as well as the application of advanced technologies is needed to correctly and quickly address the current energy transition process of Kosovo into a CO2- neutral energy system. Within the framework of achieving EU objectives, five strategic objectives have been proposed in Kosovo's energy strategy by 2030: Improving the reliability of the system; Decarbonization and promotion of renewable energy; Increasing energy efficiency; Strengthening regional cooperation and market functioning; Consumer protection and empowerment.

In this direction, research should be carried out in the electricity sector, the interconnection of the electricity, heating, cooling, transport, agriculture and industry sectors, as well as different forms of electricity accumulation. Research should also be conducted in the reduction of electrical losses, the distribution of thermal energy, the increase of efficiency in different sectors, based on the connection of sectors and smart communication. These are key researches to intervene in the framework of the creation of a functional energy system in Kosovo based on the concept of "smart energy systems" which enable the achievement of energy objectives at a lower cost.

- Environment and climate change

Ensuring a healthy environment and sustainable economic development in today's time means, in the first place, the elimination of all potential pollutants from the air, water and soil that directly or indirectly endanger human life. The quality of air, water and soil in Kosovo is not at the right level. The production of electricity based on coal, transport and heating with wood and coal affect the environment. The total amount of carbon dioxide gas emissions from the energy system in Kosovo in 2019 was 8.61 million tons/year. Transport also causes environmental pollution at a significant level. According to the Environmental Protection Agency (EPA), transportation in Kosovo releases about 1.8 million CO2 per/year, or about 25% of the amount of CO2 released by power plants in Kosovo. Currently, the contribution of the heating and transport sectors to the release of CO2 at the world level is 55% - 60%[29] whereas in Kosovo, these two sectors contribute with 27% or 38.2%[24]. Global CO2 pollution, as a result of anthropogenic activities, has reached its highest level. The emission of CO2 on a global scale, as a result of anthropogenic activities, is estimated at 38 billion tons for the year 2020 and 39.3 billion tons for 2021. [30] The increase in the concentration of CO2, methane and nitrogen oxides has emphasized the effect of global warming or the "greenhouse" effect, so that during the summer there are greater increases in temperatures at the global level, which result in unprecedented droughts in some countries of the globe, while in some places in rains and floods.

Various industrial activities are the cause of river water pollution with heavy metals and other toxic products. Today, water pollution with chemical products and various wastes, dominated by plastic masses, is an acute problem as an open threat to the aquatic ecosystem and the entire food chain. The use of pesticides and other chemical products in agriculture also presents a problem in itself. These effects of human activities, undoubtedly, have influenced the evident climate changes, and the agreement at the global level is that we must do our best not to go to the extent of irreversible changes. For this reason, it is urgently required to reduce the emission of greenhouse gases.

[28] European Commission. COM(2019) 640 Final Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions—The European Green Deal. 2019. Available online: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1576150542719&uri=COM%3A2019% 3A640%3AFIN (accessed on 30 September 2021).

[29] International Energy Agency [IEA], 2020. Word energy balanced. Accessed on 10.06.2020. https://www.iea.org/. Accessed: Oct. 01, 2020. [Online]. Available: https://www.iea.org/

[30] Friedlingstein, Pierre; O'Sullivan, Michael; Jones, Matthew W.; Andrew, Robbie M.; Hauck, Judith; Olsen, Are et al. (2020): Global Carbon Budget 2020. In Earth Syst. Sci. Data 12 (4), pp. 3269–3340. DOI: 10.5194/essd-12-3269-2020.

4.4.2. Expected impacts of priority 3 and cross priority complementarities

Addressing the above challenges in the first place in relation to energy, natural resources and the environment offer many opportunities for the conducting of scientific research in Kosovo. The steps that are proposed to be undertaken in scientific research and innovation within the NSP should have as a result the expected impacts in the following areas.

- Efficient use of natural resources

The use and conservation of natural resources should be based on the institutional development of human capacities, intensive geological research on a large scale of current resources and the search for new mineral resources. In the current context of economic and energy problems, it is necessary to preserve and rationally and efficiently use mineral, water, land and forest assets as strategic assets of Kosovo. Research should be focused on renewable energy, CO2 capture and sequestration/reuse, energy efficiency, household/industrial energy use, smart grids, energy storage through batteries, hydrogen production, and power transmission. Scientific research that is included in the framework of the circular economy starts from the stage of processing ores into added value materials, the efficient use of materials and up to their recycling.

- Decarbonization

The degree of decarbonization targeted in accordance with international agreements can be achieved through the reduction of CO2 emissions or its efficient removal from the atmosphere, the use of future transport and the use of other energy sources. Developments in this field are related to the digital transformation and especially to the implementation of the Green Deal.

- Continuous monitoring of the environment

For monitoring purposes, research and analysis laboratories must be equipped with equipment that enables the monitoring of all physico-chemical and microbiological parameters of water and air quality according to EU directive No. 2013/39/EU, to reduce the emission of greenhouse gases and to work on the diversification of energy production. The conducting of scientific research should lead to the finding of solutions for the elimination of various pollutants as well as the reduction of the emission of pollutants from transport, and the creation of intelligent systems for the optimization of systems. Digitized systems should be developed and implemented for continuous monitoring and data collection for scientific research and innovation that lead to finding solutions for the elimination of various pollutants from land, water and air, reducing the emission of pollutants from transport, and industry, heating etc. and in creating intelligent systems for system optimization.

- New materials for advanced energy, robotic, and sensor systems

Scientific research should be oriented towards new materials of importance for energy production, transport, efficient use as well as the processing of materials from nanotechnology and nanocomposites. Increased attention should be paid to research in advanced energy systems, robotics and sensor systems. This includes scientific research from the stage of ore processing to value-added materials, the efficient use of materials and their recycling.

- Environmental sustainability of industrial and transport systems

The conducting of scientific research in systems of particular importance (such as energy, water, agriculture, construction, etc.), then the use of efficient and advanced transport in various sectors and integration into a smart system directly affects environmental sustainability. Such an approach can also help in increasing productivity, processing materials and reducing losses in industry, the sustainable use of plastic materials, and will have an impact on the circular economy, material recycling, life cycle assessment and analysis of a product (LCA).

The expected impacts and impact of the priority area Natural resources, energy, environment and climate change on other priority areas is presented in the following Tables 5. and 6.

Table 5. Overview of expected impacts of intervention areas and scientific research activities

| **Priority 3. Natural resources, energy, environment and climate change** | | | |
|---|---|---|---|
| **Expected impacts** | **Areas of intervention and priority scientific research activities** | **Implementation responsibility*** | **Funding provision**** |
| **Efficient use of natural resources** | ● Establishment of the State Interdisciplinary Institute for Science and Technology (Objective 6);<br>● Encouraging interdisciplinary programs in the advancement of young researchers in the field of environment, natural sciences, engineering and other cross-sectoral fields;<br>● Development of joint programs in higher education institutions and raising human capacities;<br>● Improving the existing research infrastructure;<br>● The establishment of competence centers and the development of professional programs and intensive advanced courses. | HEI/SRI, MESTI, MIET | GK/IC |
| **Decarbonization** | ● Ensuring the operation of doctoral and post-doctoral programs that support the connection between the chain of scientific research - innovation - and industry;<br>● Establishment of competence centers and the development of professional programs and intensive advanced courses.;<br>● Integration of courses certified by new technology, for training in the development of skills in the use of innovative and environmental practices, green energy, etc. | HEI/SRI, MESTI | GK/IC |
| **Continuous environmental monitoring and digitization** | ● Environmental monitoring using technical-technological progress and digitalization;<br>● Completion of research and analysis laboratories with equipment that enables water and air monitoring;<br>● Reducing greenhouse gas emissions and diversifying energy production;<br>● Management and treatment of waste related to minerals and their use, advanced materials, electrical engineering systems, information and communication technology systems, electronic and robotic systems, circular economy, etc.. | HEI/SRI/ MESPI | GK/IC |
| **New materials for advanced energy, robotic, and sensor systems** | ● Advancement of scientific research in materials for advanced energy/robotic/sensor systems;<br>● Increasing the added value of metals and minerals from ores;<br>● Development and promotion of scientific research from the stage of ore processing into value-added materials, efficient use of materials and up to their recycling. | MESPI | GK/IC |
| **Environmental sustainability of industrial and transport systems** | ● Support and acceleration of technological transformation in environmental fields in the production, transmission, storage and sustainable/effective use of energy;<br>● Use of renewable energy, CO2 capture and sequestration;<br>● Energy efficiency and decarbonization;<br>● Sustainable, efficient/smart transport with low impact on the environment; Preparation of technology and network for electric transport; challenges around rail development – control/reliability;<br>● Increasing productivity during the processing of materials in industry, reducing losses;<br>● New materials and sustainable use of plastic materials and their recycling;<br>● Development of recommendations for national policies and harmonization with EU policies on environmental protection and inclusion in circular economy, blue economy, etc. | HEI/MESTI/Industry | GK/IC |

* HEI = Higher Education Institutions; SRI= Scientific Research Institutes; Industry = Various Corporations; MESTI = Ministry of Education, Science, Technology and Innovation; MESPI = Ministry of Environment, Spatial Planning and Infrastructure; GK = Government of Kosovo; IC = International Cooperation.

Table 6. General description of cross-priority and cross-sectoral complementarities

| **Priority 3. Natural resources, energy, environment and climate change** | |
|---|---|
| **Priority** | **Relevant expected impact of the priority** |
| 1. Health | ● The use of modern technologies based on new materials and sufficient and clean energy affect the quality of life and well-being;<br>● Raising interest in the efficient and effective use of energy from renewable sources that enables the reduction rate of gases that cause the greenhouse effect;<br>● The use of means of transport that do not cause pollution and the connection of the heating and cooling system to the smart electrical network will enable the reduction of environmental pollution. |
| 2. Society, education, culture, economy and social sciences and humanities | ● Encouraging cooperation between universities - research institutes supported, open society with a comprehensive multidisciplinary program that enables the efficient use of natural resources and the rational use of energy resources and the preservation of the environment;<br>● Strengthening and development of HEIs and internationally competitive research institutes with new scientific, social, cultural and economic values within this priority;<br>● The establishment of research and innovation infrastructure within the sciences that deal with the tracking, discovery, extraction and processing of materials, the increase and internationalization of scientific research activity. |
| 4. Agricultural production, food and bioeconomy | ● The use of new technologies for the extraction and processing of materials and the production of electricity using renewable energy sources reduces the pollution of the environment, agricultural lands and crops;<br>● The use of new technologies enables the revitalization of agricultural lands, the purification of water from various pollutants, i.e. it affects the regional economy;<br>● Large-scale use of equipment, different sensors that observe different physical-chemical, biological, etc. parameters. With an integrated monitoring system for tracking water, air and soil quality in real time. |
| **Cross-sectoral priority** | **Relevant expected impact of the priority** |
| 5. Green Deal | ● Development and delivery of specific educational programs at HEI level, school curricula, lifelong learning courses within the Multidisciplinary Climate Change Competency Framework covering key areas of the Green Deal. |
| 6. Digitalization | ● Develop and implement digital systems and networks that help in the green transformation in the areas related to priority 3 of the NSP;<br>● ● Smart digital systems are developed and piloted for monitoring relevant parameters in the field of energy, environment, natural resources and climate change. |

## 4.5. Priority 4: Agricultural production, food and bioeconomy

### 4.5.1. Background and framework

Currently, we are witnessing major environmental changes that require new, immediate approaches to the adequate and sustainable use of natural resources and their diversity that ensure increased agricultural production, food security and bioeconomy on our planet. The challenges of recent years of a global character (e.g.: The Covid-19 pandemic, various conflicts, global warming, gas emissions, etc.), also related to unilateral human activities, seem to have a negative impact on the entire ecosystem, such as: land, water, air and other vital resources. These negative, in some cases irreversible impacts, greatly complicate the production, processing, uniform distribution and consumption of food, as well as require diversification, well-managed rational use of resources, to ensure quality in people's lives and security for their future. In this regard, Kosovo faces almost the same challenges as other countries in the world, of the nature of agricultural production, food security, the use of natural resources and environmental aspects, but often these challenges in our country are even more pronounced. The contribution towards the preservation and rational use of natural resources, the increase of agricultural production and food security, prevention of environmental degradation, implementation of rules and laws, through the development of infrastructure and human capital, has an important role in the preparation and prevention of situations of possible environmental, health, socio-economic and well-being effects in general in the country and beyond.

To develop balanced approach between "how much food production resources are used and how much they are preserved", the fulfilment of socio-economic objectives, as well as to ensure a fair and inclusive transition, we must consider the aspects related to the sustainable and circular economy which is provided through R&D solutions and innovation based on clean and functional ecosystems, sustainable food systems based on nature, integrated management of water, soil and nutrients, as well as digitalization and rational use of the data.

Issues related to agriculture, forestry, aquaculture, conservation-based systems and increased agricultural food production, including alternative and organic food production, are key concerns for food security, health, economic growth, creation of jobs and social aspects. In this regard, the strategic program planning and investment in scientific research and development (R&D) in our country is included into the framework of a proper and adequate response to these challenges and will simultaneously be in full accordance with the strategic documents at the local and international level, as the National Development Strategy 2030[31], Food Law[32], Law on Agriculture and Rural Development, Program on Agriculture and Rural Development[33], Environmental Protection Strategy 2013 – 2022[34], Agriculture and Rural Development Strategy 2022 – 2028[35], Strategic Plan "Horizon Europe" 2021-2024[36], European Green Deal[37], The Science Europe Strategy 2021–2026[38], Building an economy that works for people[39], United Nations Framework Convention on Climate Change -UNFCCC[40], etc.

[31] Government of Kosovo, National Development Strategy 2030, Strategjia kombëtare për zhvillim - 2030 - Zyra e Kryeministrit (rks-gov.net)

[32] Food Law: https://gzk.rks-gov.net/ActDocumentDetail.aspx?ActID=2626

[33] MAFRD, Food Law, Law on Agriculture and Rural Development, Program on Agriculture and Rural Development. https://gzk.rks-gov.net/ActDetail.aspx?ActID=2642

[34] MAFRD , Environmental Protection Strategy 2013 – 2022. https://mmphi.rks-gov.net/assets/cms/uploads/files/Publikimet/Strategjia_e_Mbrojtjes_s%C3%AB_Mjedisit_-_2013_-2022_Shqip_748721.pdf

[35] MAFRD,Agriculture and Rural Development Strategy 2022 – 2028: https://www.mbpzhr-ks.net/repository/docs/STRATEGJIA_20222028_FINAL_ALB_Web_Noprint_me_04.07.2022.pdf

[36] EC, Horizon Europe Action Plan 2021 – 2024. https://www.eeas.europa.eu/sites/default/files/horizon_europe_strategic_plan_2021-2024.pdf

[37] EC, The European green deal communication. https://ec.europa.eu/info/sites/default/files/european-green-deal-communication_en.pdf.

[38] EC, The Science Europe Strategy 2021–2026. https://scienceeurope.org/media/wzufetmc/20210617_se_strategy.pdf.

[39] Building an economy that works for people: an action plan for the social economy. https://base.socioeco.org/docs/building-an-economy-that-works-for-people-an-action-plan-for-the-social-economy.pdf

[40] UNFCCC ,2019. United Nations Framework Convention on Climate Change -UNFCCC. https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en

### 4.5.2. Expected impacts of priority 4 and interaction with other priorities

- Ensuring the sustainable development of the "farm-to-table" food chain for all

Global challenges, especially in recent years, as a result of the Covid-19 pandemic, environmental changes and other conflicts in the world, have again brought into focus the irreplaceable vital importance of agricultural production and food security. In Kosovo, agricultural production and food security continue to be considered strategic sectors that aim to provide: further development of agricultural production and processing capacities, safe food based on international standards, improvement of the food chain, creation of conditions as a "self-supply" country for the majority of food products and reduction of import dependence, increased opportunities for exporting specific products to open international markets, increased jobs, integration into international organizations, improvement of life in rural areas, sustainable and balanced development in the community and economic growth in the country. Despite the vital, economic and social importance of food, the scope of scientific and innovative research in this industry remains at a low level. This presents a challenge to transforming the Kosovar agricultural production towards modern sustainable production and food safety with international standards. The NSP envisages key research and innovation activities focusing on food and nutrition governance and knowledge; empowering farmers to manage land, water, plant and animal production; reducing the use of artificial fertilizers and pesticides; meeting environmental standards; the "one health" approach; increasing food diversity (new foods based on alternative nutrients for humans and animals); development of antimicrobial preparations, food tracking for humans and animals; reduction of food losses and waste; forest management; transforming food systems towards healthy and sustainable diets; promoting and developing solutions based on digital technology enabling sustainability and transparency, as well as increasing data generation capacities and their effectiveness.

- Ensuring sustainable and circular management and use of natural-based food resources

The rate of economic development of a country, in the first place, depends on natural food resources and their rational management. This development will depend directly on the support, use and sustainable and circular management of local natural resources necessary to ensure food production, public health, environmental protection and socio-economic development of the Republic of Kosovo. R&D activities aimed at innovative solutions should be developed to increase the efficiency of the use and management of resources along the entire chain of life and its quality, for rational use of natural resources (water, land, air), control of pollutants, use of the circular economic system, alternative and renewable food sources. Also, priority 4 will address the need for social and economic balance by researching the identification and development of existing natural food resources and those that for various reasons have been left out of the country's developmental and social context. This will ensure competitiveness and contribution to the growth and fair distribution of the added value chain of natural food resources in the country, as well as the creation of appropriate conditions in areas that are less favoured from a social and economic point of view. Scientific and innovative research approaches will enable: sustainable management of natural resources; systemic development to better cope with the impacts of natural disasters and various pandemics; economic efficiency of the use of natural resources; circular economic system; alternative and renewable use of natural food resources, as well as monitoring the environmental impact during their use.

- Agricultural activities in a more suitable environment

Already, it is known that environmental changes have become a serious threat to agricultural production, human health, bioeconomy and society in general. The one-sided development of the industry for decades, without prior recognition and strategic planning of environmental side effects, has brought about multidimensional problems. Undoubtedly, the increase in the food needs of the population in the country requires rapid development, which in any case must take into account the environmental changes, as well as be in cohesion and complement each other (reduction of the emission of carbon and other polluting gases, despite the increase of agricultural production and industrial processing; planning, adaptation and coping with environmental changes, etc.). Research in this field will enable objective approaches by promoting and strengthening the efficient and sustainable use of natural agricultural resources, forests, biodiversity, land and water (innovative production, alternative production - "new foods" and renewables, waste management system, ecosystem conservation, etc.). Scientific research and research activities will support the planning, implementation and monitoring of activities, based on the provision and adaptation of adequate environmental

capacities.

- Biodiversity recovery, conservation and renewal of the ecosystem

In the last decade, the general situation of the loss of biodiversity worldwide is alarming, currently the required changes are not happening in the right way, which requires the increased commitment of all relevant actors in this direction. In the case of Kosovo, even though this segment has been addressed through the document Strategy and Action Plan for Biodiversity 2011 - 2020 and some sporadic fragmented activities, there are marked delays in concrete actions and initiatives. The R&D activities of this field, through priority 4, will aim at the correct understanding, better assessment, monitoring, restoration and management of the system of biodiversity and ecosystem services in our country. The long-term planning of the preservation of the biodiversity of plants and animals, the diversity of landscapes, the protection of nature, as well as the way of implementation in harmony with the overall economic, social and cultural development in the country, will be a primary priority and will create a platform of appropriate for contribution and cooperation at the regional, European and world level.

- Sustainable, balanced and comprehensive development of rural and urban areas

Increasing the competitiveness of the agri-food sector, improving the quality of life of residents in rural and urban areas through the diversification of agricultural and non-agricultural activities and the protection of the environment and natural resources are the key points for a sustainable development in Kosovo. The correct understanding of the impacts of the climate and the environment and the socio-economic and demographic impacts, creates equal living opportunities by strengthening the comprehensive territorial development of our country. In order to intensify sustainable development and in compliance with the country's strategic documents, priority 4 foresees multidisciplinary research and development activities with an emphasis on social and gender aspects, the behaviours and values of producers, consumers and all other actors in rural and urban areas, contributing to their working conditions, fostering innovative initiatives driven by the need in the community with a focus on digital transformation, nature-based solutions, access to services and long-term socio-economic perspectives in the context of improving their quality of life. In rural environments, the emphasis of research and development actions will be on the protection of the ecosystem, climate adaptation, the use of renewable energy, quality life (recreation, appropriate diets, consumer behaviour, etc.) and socio-economic development (agro - tourism, non-agricultural activities, etc.).

- Creating governance models that enable sustainability and resilience

To enable sustainable development in the country, R&D activities will provide knowledge and create effective mechanisms to support policy design, implementation and monitoring for sustainable development. Special emphasis of the activities will be the development and use of metrics and standards for monitoring agricultural and environmental production, digital application and accurate data technologies to assess socio-economic and environmental aspects, systems and flows to provide relevant and reliable information for proper decision-making. The knowledge gained and appropriate decision-making based on research and development activities will encourage inclusiveness of stakeholders, increase the possibility of equal participation in the value chain, ensure community leadership to benefit everyone, from primary producers to consumers, as well as will create genuine bases of governance and development models, promoting sustainable solutions that will be feasible. The expected impacts and impact of the priority area Agricultural production, food and bioeconomy on other priority areas are presented in the following Tables 7 and 8.

Table 7. Overview of expected impacts of intervention areas and scientific research activities

| **Priority 4. Agricultural production, food and bioeconomy** | | | |
|---|---|---|---|
| **Expected impacts** | **Areas of intervention and priority scientific research activities** | **Implementation responsibility*** | **Funding provision **** |
| **Ensuring the sustainable development of the "farm-to-table" food chain for all** | ● Research, control and monitoring of the food production chain;<br>● Tracking food safety, quality and implementation of food chain standards;<br>● Study of wood production, improvement, conservation, health and use of forests;<br>● Study and adaptation to the impact of global changes on agricultural, forestry and bioeconomy production;<br>● Research and implementation of added value for agricultural and forest products by improving processing and marketing activities;<br>● Observation and monitoring of water quality necessary for increased production, public health, environmental protection and socio-economic development;<br>● Development and use of new sustainable technologies in agricultural production, food security, forest management and bioeconomy;<br>● Development and promotion of alternative food products;<br>● Sustainable development of biodiversity based on the use of the food chain;<br>● The study and support of sustainable development through the research of agricultural and non-agricultural activities without causing any damage to environmental resources;<br>● Research and control of vectors, zoonotic diseases, resistance to antibiotics, pathogenic bacteria and resistance of insect pests to insecticides. | HEI/SRI/Industry/AUV/MAFRD/DCP. | GK/IC |
| **Ensuring sustainable and circular management and use of natural-based food resources** | ● Research, control and management of existing natural food resources;<br>● Identification and development of new natural food sources;<br>● Development and sustainable use of water resources;<br>● Monitoring and protection of water resources from pollution, over exploitation and misuse;<br>● Development of new efficient and flexible technologies for the use of natural resources;<br>● Development and promotion of a bioeconomy based on renewable natural food resources;<br>● Sustainable development of biodiversity based on the sustainable use of natural food resources;<br>● Research, development and sustainable promotion of the circular system of natural food resources. | HEI/SRI/Industry/AUV/MAFRD/DCP. | GK/IC |
| **Agricultural activities affect a more suitable environment** | ● Research, control and monitoring of water, soil and air quality;<br>● Study, development and implementation of safety standards at the level of the farm and processing units;<br>● Development and sustainable use of water resources;<br>● Promotion of a bioeconomy based on renewable and alternative resources;<br>● Studying, addressing and providing solutions to complex challenges related to agricultural production, forests, water and soil;<br>● Sustainable development of biodiversity based on the sustainable use of natural resources as a response to population growth and the ever-increasing need for food and quality life;<br>● Research on the emission of gases and other pollutants during the production, processing, distribution and use of food products. | HEI/SRI/Industry/AUV/MAFRD. | GK/IC |
| **Biodiversity recovery, conservation and ecosystem renewal** | ● Research, control and monitoring of the quality of water, soil and air ecosystems;<br>● Study, development and sustainable use of water resources;<br>● Research, development and promotion of efficient and flexible innovative systems aimed at preserving and developing biodiversity;<br>● Study and sustainable development of biodiversity based on the sustainable use of natural resources;<br>● Sustainable development and promotion of the circular system of biodiversity. | HEI/SRI/Industry/AUV/MAFRD. | GK/IC |

| | | | |
|---|---|---|---|
| **Sustainable, balanced and comprehensive development of rural and urban areas** | ● Research, control and monitoring of the quality of life in rural and urban areas;<br>● Development and promotion of urban agriculture; Development of rural agrotourism;<br>● Development and sustainable use of water resources in rural and urban areas;<br>● Equal access to the use of water resources;<br>● Development and implementation of efficient and flexible systems that ensure sustainable development of rural and urban areas;<br>● Development of efficient circular system specific to different areas;<br>● Studying and supporting sustainable development and improving the quality of life through the promotion of agricultural and non-agricultural activities;<br>● Equal access of consumers. | HEI/SRI/Industry/AUV/MAFRD. | GK/IC |
| **Creating governance models that enable sustainability and resilience** | ● Study, development and use of metrics/standards for monitoring agricultural and environmental products that increase production and quality of life and alignment with those of the EU;<br>● Development and application of digital and accurate data technologies;<br>● Development and promotion of models aimed at the circular system and equal access. | HEI/SRI/Industry/AUV/MAFRD. | GK/IC |

* HEI = Higher Education Institutions; SRI= Scientific Research Institutes; Industry = Various corporations: ** GK = Government of Kosovo; IC = International Cooperation; AUV=Veterinary and Food Agency; MAFRD=Ministry of Agriculture, Forestry and Rural Development; DCP=Department for Consumer Protection.

Table 8. General description of cross-priority and cross-sectoral complementarities.

| **Priority 4. Agricultural production, food and bioeconomy** | |
|---|---|
| **Priority** | **Relevant expected impact of the priority** |
| 1. Health | ● Ensuring better health for all through appropriate diets;<br>● Effective prevention and treatment of diseases, as well as control of zoonotic diseases with the "One health" concept;<br>● Improving physical and mental health and well-being;<br>● Reducing the impact of pollution from agricultural activities. |
| 2. Society, education, culture, economy and social sciences & humanities | ● Implementation of integrated policies for the specific needs of the community;<br>● Enabling equal access to living in a healthy environment;<br>● Developing a balanced quality of life in rural and urban areas;<br>● Develop and preserve the natural and cultural heritage (landscapes, biodiversity, etc.).). |
| 3. Natural resources, energy, environment and climate change | ● Providing advanced scientific solutions that enable efficient and flexible use of natural resources.<br>● Providing nature-based solutions for energy, climate and pollutants in rural and urban areas (energy efficiency in buildings and different environments, etc.).<br>● Development of an effective system of environmental observation and monitoring, use of natural resources, energy, transport, etc. |
| **Cross-sectoral priority** | **Relevant expected impact of the priority** |
| 4. Grean Deal | ● Development of HEI level programs and curricula for the multidisciplinary Competency Framework for Climate Change. |
| 5. Digitalization | ● Have an integrated digital data management system in place.<br>● Develop new innovative digital technologies with an impact on the circular economy and ecosystem.<br>● Ensure an effective functional environmental monitoring system. |

## 4.6. Priority 5. The Green Deal

### 4.6.1. Background and framework

Europe's challenge to become the first climate-neutral continent by 2050 will be crucial, especially in light of the impending economic crisis caused by the COVID-19 pandemic and the war in Ukraine. Renewable energy, nature-based solutions, the green deal and the circular economy present promising opportunities for new working conditions and equal opportunities for all, including people with disabilities and people of different ages, genders, nationalities and cultures. The environmental ambition of the EU Green Deal[41] to achieve emissions neutrality by 2050 requires a systemic transformation in economy, politics and society. Such transformation implies changes in education, science, infrastructure, culture and behaviour. At a time when European countries need to accelerate a systemic transformation for climate protection through innovation (technological, social and economic), educational and research systems and institutions are seen as powerful catalysts for changing people's behaviour and skills and scientific and innovative developments in support of the objectives included in the Green Deal. The main segments of the development of educational and research institutions towards a European education area until 2025 are (i) quality, (ii) inclusion and gender equality, (iii) green transition and digitalization. The priority objectives of educational and research institutions for the green and digital transition are the promotion of sustainable education and research, strengthening the skills and competencies of students, teachers, researchers and the wider scientific community in general.

The right to quality and comprehensive education, training and research throughout life is declared as the first principle in the European Pillar of Social Rights jointly announced by EU leaders. At the same time, the recommendations of the European Council on key competences in education and research point to a harmonization of needs with skill requirements for new jobs that require automation, technology as well as entrepreneurial, social and civic competences. According to recent studies, and despite the growth of the digital system in education in recent years, women are only 26% represented in the engineering, manufacturing and construction sectors and only 18% in the ICT sector. The participation of adults in learning has increased to 10.8%, while it has not reached the target level of 15%. Therefore, the green transition and digitalization require efforts and investments in education and training to improve opportunities for all and ensure a fair transition of jobs to digital technologies and sustainable climate-neutral economic models, increasing the number of qualified and the number of workers in the new economy. Starting from these goals, the European Education Area will create conditions for the realization of a new educational framework and balanced training according to gender and age. The European Competency Framework outlined in the EU Green Deal and the European Climate Pact is linked to the Council's Recommendation on Education for Environmental Sustainability as well as basic guidance for schools and higher education institutions with a focus on environmental sustainability-oriented education. This approach is expected to help develop and assess knowledge, skills and attitudes about climate change and sustainable development.

To realize these objectives, the Green Deal package must bring together regional and local authorities, civil society, industry and schools for joint engagements in changing approaches and joint investments. Therefore, the development of climate innovation through science impact and citizen involvement can have great potential for environmental benefits and ongoing progress and education. In this regard, science and research act on three interrelated factors that influence the green deal: environmental education (EM), education for sustainable development (ESD) and climate change education (CCE). The three aforementioned factors contribute to the development of a balanced social, economic and environmental order. For the preservation of the natural environment, the transfer of knowledge should start from the reduction of greenhouse gas emissions, investment in research and more advanced innovation. The importance of research on this topic in Kosovo is essential to promote transformative climate change and ensure that all students have the skills and knowledge they need to become responsible citizens and contribute to the implementation of the Green Deal. So far, investment in science on climate change has not met the urgent demand, despite the recognition it has received at the international policy level. Education systems must encourage students, staff, other

[41] EC, Green Deal: Priorities 2019-2024. https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

professionals and citizens to engage with the challenges we face and drive research, develop solutions for climate change mitigation and adaptation, and take a leading role in the necessary public discourse.

While the European Green Deal sets out the legislative framework to create space for climate change transition, it also brings some fundamental challenges for which EU member states (mainly industrialized countries) and countries in transition must find an immediate solution. for the implementation of effective climate policies and practice. In most countries, top-down policy models leave little room for citizen participation in policy-making processes. National and local policies and practices are usually guided only by technological evidence and rarely seek the voice of citizens. Considering the current situation at this point, it is important to assess the relevant governance structures, institutions, policies and practices and examine whether existing top-down models are adequate to adapt citizen participation to meet these objectives.

Another important aspect is also the increase of understanding and awareness among policy makers, scientists and other actors. Investments in science and involvement in the green deal must be pushed further up the policy agenda beyond education and harness socio-economic, socio-cultural and gender aspects for the essential dynamics of the necessary transformation. Moreover, the comprehensive nature of lifelong learning and the application of science in this direction must be recognized by all stakeholders, support actors engaged in green transformation and help in the challenges towards the adaptation of society. High-quality and comprehensive science, education, training and lifelong learning provide opportunities for everyone to develop key competences. From this perspective, competency-oriented courses in environmental science and sustainability must address the challenge of balancing short-term human needs with health, environmental conservation, environmental policy, sustainability, and interdisciplinary advancements.. In order to support the pathways to the development of climate change innovations that may exist in local and national governments, there is a need for knowledge and information on citizen science approaches, social groups, participation and engagement models (so-called participatory models) that lay the foundations for effective practical change and support for outreach to the wider community, including digital media.

Cross-border knowledge, dialogue and exchange of experiences between generations, schools, universities, training. research institutions, municipalities, public authorities in cooperation with the private sector, parents and citizens are also necessary for environmental protection and active participation. In pursuit of this priority, the National Science Program aims to strengthen scientific and research capabilities in Kosovo and change systems through study, experimentation and demonstration in science. The program aims to promote new initiatives towards climate change adaptation and the role of science in this direction. The program also invites and gives opportunities, in addition to researchers, to citizens, organizations and communities to engage in specific actions as Ambassadors of the Climate Pact and digital changes. In this dimension, these challenges are summarized in the expected impacts listed below.

#### 4.6.2. Expected impacts of priority 5. and cross priority complementarities

- Development of the Multidisciplinary Competency Framework for Climate Change as a reference tool for engagement in the green transformation of society

For the development of the multidisciplinary Climate Change Competency Framework, innovative collaborative multi-stakeholder approaches will be used to generate and co-evaluate the Framework, and the recommendations of scientists from the natural sciences, engineering and technology, social sciences, humanities will be taken into consideration. The framework will include good practice scenarios, create and test research capacity building activities on climate change adaptation and study these scenarios, policies and practices that promote or hinder climate change adaptation initiatives. The framework aims to create and design a multidisciplinary competency framework and action plans using a multi-level perspective based on the diversity of competences, especially natural sciences, technology and mathematics, but also social, personal, entrepreneurial, civic and digital competences. For this area, intervention and scientific activities should focus on the design of a multidisciplinary framework of competences using a multi-level perspective approach of the adaptation of relevant actors to climate change, adapted to each participating country in the main areas of the European Green Deal.

- Implementation of the multidisciplinary Climate Change Competency Framework through advanced laboratories operating within the triple helix model

The Climate Change Innovation Labs will implement and validate the multidisciplinary Climate Change Competency Framework through demonstration activities, lifelong learning concepts, specific educational programs, training and networking activities, ensuring a sustainable environmental perspective. Scientific activities will use innovative multi-stakeholder collaborative approaches, through which findings and developed models will be integrated into the Climate Change Platform within the State Interdisciplinary Institute for Science and Technology. To this end, scientific and innovative intervention and activities should include: Creating a Climate Change Innovation Laboratory, serving as a centre for the cumulative generation of knowledge; Increasing human, technical and organizational capacities as well as increasing networking activities; Designing a Climate Change Framework platform, integrating green deal projects, digital tools and scientific achievements and using artificial intelligence (AI) methods, database analysis and other technologies from the field of engineering and ICT. Climate Change Innovation Laboratories also serve as knowledge centres for the engagement of potential actors through the development of start-up/spin-off technology for environmental use. Advancement of academic group networking model, strategies and digital platforms to support inclusive integration, decision-making power and other services that promote the Green Deal awareness, communication and empowerment.

- Supporting new programs within the triple helix model

For this purpose, expected activities are: evaluation of existing regulations, requirements, standards and program models in the context of environmental sustainability and in accordance with the objectives of the EU Green Deal; Development and delivery of interdisciplinary doctoral, post-doctoral and mobility programs in key areas of the Green Deal.

- Development, provision and harmonization of national policy recommendations with EU policies for strategies directed towards green and digital transition

The established Climate Change Innovation Labs will function as hubs that bring together citizens and policy makers to work towards the goals of the Green Deal and the Biodiversity Strategy. Based on the findings and evidence gathered from scientific research, policy recommendations will be developed and shared with relevant actors using a polycentric governance approach. For this purpose, the expected activities are: International comparison of existing and potential citizen initiatives, scenarios, policy guides and action plans; International comparison and assessment of socio-political, socio-economic, gender and cross-sectoral aspects that enable and/or hinder citizens' commitment to climate change adaptation; Deriving valuable recommendations that support the climate change transition.

The expected impacts and the impact of the priority area The Green Deal on other priority areas are shown in Table 9 and 10 below.

Table 9. Overview of expected impacts of intervention areas and scientific research activities

| **Priority 5. The Green Deal** | | | |
|---|---|---|---|
| **Expected impacts** | **Areas of intervention and priority scientific research activities** | **Implementation responsibility*** | **Funding provision**** |
| **Development of the Multidisciplinary Climate Change Competency Framework as a reference tool for engagement in the green transformation of society** | • Designing a multidisciplinary climate change competency framework with a multi-level approach to the adaptation perspective of relevant actors and key areas of the Green Deal. | HEI/SRI, MESTI, GK | GK/IC |
| **Implementation of the Multidisciplinary Climate Change Competency** | • Increasing human, technical, organizational and networking capacities;<br>• Designing a Climate Change Framework platform, integrating Green | HEI/SRI, MESTI | HEI/ SRI/MESTI |

| | | | |
|---|---|---|---|
| **Framework through advanced laboratories operating within the triple helix model** | Deal projects, digitalization, artificial intelligence (AI), database analysis and other technologies;<br>● Climate Change Innovation Laboratories to be knowledge centers for the engagement of potential actors through the development of start-up/spin-off for environmental use;<br>● Advance the networking model of academic groups, strategies and digital platforms for inclusive integration, which promote the Green Deal awareness and empowerment. | | |
| **Development, provision and harmonization of national policy recommendations with EU policies for strategies directed towards green and digital transition** | ● Evaluation of regulations, standards and curriculum models in accordance with the objectives of the EU Green Deal;<br>● Development and delivery of specific programs in HEI, covering the main areas of the Green Deal;<br>● International comparison of citizens' initiatives, scenarios, policy guidelines and action plans;<br>● International comparison and assessment of socio-political, socio-economic, gender and cross-sectoral aspects of adaptation to climate change;<br>● Deriving valid recommendations that support the climate change transition. | HEI/MESTI/ Industry | GK |

* HEI = Higher Education Institutions; SRI= Scientific Research Institutes; Industry = Various Corporations; MESTI = Ministry of Education, Science, Technology and Innovation; MoD = Ministry of Defence, MIA = Ministry of Internal Affairs; MAFRD = Ministry of Agriculture, Forestry and Rural Development; MED= Ministry of Economic Development; MESPI = Ministry of Environment, Spatial Planning and Infrastructure; MoJ = Ministry of Justice; MoH = Ministry of Health;
** GK= Government of Kosovo; IC= International Cooperation.

Table 10. General description of cross-priority and cross-sectoral complementarities

| **Priority 5. The Green Deal** | |
|---|---|
| **Priority** | **Relevant expected impact of the priority** |
| 1. Health | ● Empowerment of broad opinion for the implementation of the Green Deal;<br>● Increasing the quality of health and well-being of the population. |
| 2. Society, education, culture, economy and social sciences and humanities | ● Encouraging cooperation between universities - research institutes supported, open society with a comprehensive program for the cultivation of multidisciplinary talents;<br>● Empowerment and development of public/private universities and internationally competitive research institutes with new scientific, social, cultural and economic values;<br>● Establishment of research and innovative infrastructure, the growth and internationalization of scientific research activity. |
| 3. Natural resources, energy, environment and climate change | ● Implementation of the Green Deal measures in monitoring environmental changes;<br>● Transmission of monitoring data in real time;<br>● Strengthening the capability of early warning of disasters;<br>● Development of an intelligent environmental monitoring technology;<br>● Development of intelligent technologies for fire prevention;<br>● Development and implementation of new technologies for transport inspection and monitoring;<br>● Development of artificial intelligence sensor technologies for water and air quality monitoring;<br>● Continuous study of environmental pollution and the application of digital technologies for characterizing, identifying and assigning the source of pollution. |
| 4. Agricultural production, food and bioeconomy | ● Ensuring the implementation of advanced digital technologies in promoting the transformation of agro-industrial production;<br>● The use of digitization and communication networks for the development of marketing strategies;<br>● Ensuring an effective and integrated digital data management system;<br>● Development of new innovative digital technologies with impact on circular economy and ecosystem related to Priority 4;<br>● Ensuring an effective functional environmental monitoring system from the database for monitoring water and air quality. |
| **Cross-sectoral priority** | **Relevant expected impact of the priority** |
| 5. Digitalization | ● Assist the Multidisciplinary Climate Change Competency Framework. |

## 4.7. Priority 6. Digitalization

### 4.7.1. Background and framework

The rapid development of science and technology, the impact of the COVID-19 pandemic on everyday life and the war in Ukraine have changed the world economy and trends in technological development, accelerating the need for restructuring. Global Competitiveness Report[42], Special Edition 2020, published by the World Economic Forum (WEF) in December 2020 and the consequences of the war on the global energy market, impose the immediate requirements, that the economic revival and transformation of the country, in the post-pandemic era and during the global energy crisis, must be based on building a new economic model that embraces innovation, new digital technologies, with special emphasis on environmental protection and sustainability. To meet Kosovo's future needs, the government must commit to creating a society driven by digital technologies and innovation.

Developed countries respond to global changes by actively investing in key industries of the future and implementing new development policies in technological focus areas. The foundations for further development and digital transformation that works for everyone must lie in ideas and actions that enable the implementation of these technologies in industry and society as a whole. In June 2020, the EU published the Digital Economy and Society Index (DESI) as part of a review of advances in digital technologies in EU countries, such as next-generation communication networks, public digital education, corporate digital applications and public digital services. This report provides an overview of the economic and social impact of digital technologies in EU countries.

Digital technologies, artificial intelligence, medical advances, communication systems and new innovative technologies have transformed our way of life. These changes as well as global economic changes and the development of new technologies force the government to address all these challenges in the near future. In this dimension there is the challenges listed below.

- Increasing capacities for basic and applied research

In the face of rapid technological development and changes, new study programs must be developed and created and scientific research in strategic areas in the latest technologies must be deepened. In addition, to increase the international visibility of science and innovation, quality research is also required. Diversifying requirements of different segments of society present the need for interdisciplinary cooperation and this cooperation must be strengthened and must be cultivated with relevant programs.

- Creating cooperation links in scientific research between the university, institutes and industry

Policies and approaches for research collaboration between universities and research institutes on the one hand and industry on the other should be established, and a mechanism for integrating these approaches and providing communication paths between them should be developed.

- Digital technology risk assessment and data management

As the use of technologies in daily activities increases, the systems and infrastructures they operate with are more exposed to risks from unwanted intrusions. The causes and consequences of these risks must be assessed and relevant strategies must be developed for the management of these risks. Innovation and technological development in this area should be supported with serious funding and accompanied by relevant regulations and laws, which would greatly limit the degree of freedom with which data can be used, misused and distributed. Therefore, open data applications and mechanisms require further and continuous improvement, as defined by the Data Protection Law.

- Digitization of industries and the digital economy

Industries in Kosovo develop very few innovative models and are not fast enough to keep pace with the rapid development of the latest technologies. Industries should be motivated and supported with scientific expertise to strengthen the integrated implementation of information and communication technology (ICT) software

[42] WEF, 2020. Global Competitiveness Report 2020 | World Economic Forum (weforum.org)

and hardware. Increasing cyber security threats, insufficient industrial revenues and resources, incompatible and non-comprehensive innovative digital support systems of key industries and limited capabilities in the application of new technologies in finance, agriculture, engineering, architecture, health, culture and transportation, are all challenges that need to be addressed. The engagement of the academic community from the field of Engineering and ICT in supporting industries for the establishment and advancement of ITRD sectors, as a bridge for industry-academy cooperation, and the creation of partnerships for competition in international funds for science, innovation and sustainable development is encouraged.

- ICT security

The rapidly growing digital economy will be constantly exposed to new forms of cyber security threats. As a result, the government and industries will eventually need more measures and investments in scientific research and innovation to protect national cyber security and the creation of a common, deep and comprehensive cyber security defence mechanism, based on the Law on classification of public documents.

In this dimension, these challenges are summarized in the expected impacts of the cross-sector digitization priority as follows.

### 4.7.2. Expected impacts of priority 6. and cross priority complementarities

- Encouraging collaboration between universities, research institutes and industry, supported by a serious program for cultivating talents in this field

Research institutes can link industry and university so that the results of scientific research are translated into industrial applications. Research institutes conduct industry analysis and assess the application and future development of key technologies, while universities conduct qualitative applied scientific research in the most current fields. Such cooperation facilitates the integration of both parties and ensures a natural way of functioning of the scientific research - innovation - industrial application chain. Therefore, the creation of research institutes within universities should be encouraged, and academic staff, through work in institutes, apply for patents, to enable their rapid implementation in industry. Research institutes can work with universities in developing courses to cultivate professionals with high professional competences. Also, research institutes and universities can build joint study programs for raising human capacities and cultivating talents in the field of ITRD.

- Recommendation for HEIs in the development of study programs in the field of digital technologies, especially in general subjects for innovative interdisciplinary talents that have international cooperation

Universities and HEIs are encouraged to develop special study programs with a scientific, applied, innovative and interdisciplinary character from the field of technology for innovative talents who have international cooperation and experience. The programs of other fields must also contain general and specific subjects from the field of applied technology in order to acquire competencies for digital transformation of society and the economy. For pre-service teacher education, the government should integrate intensive digital technology courses so that they are well trained in developing skills in using digital teaching practices and adaptive learning platforms.

- Building an environment and infrastructure for the protection of data and privacy

Building an environment and infrastructure for the protection of data and privacy is a necessary condition to provide sustainable data services and to promote the wide circulation and effective use of government and citizen data, with the aim that Kosovo becomes a "smart" country with an innovative economy. Specific approaches in this regard include the development of encryption technologies, the construction of server rooms that meet international ISO standards, and the strengthening of control mechanisms for the physical security of the environment and the security of the communication network of these server rooms, while also creating an environment for permanent data storage and backup.

- Promotion of open data and data reuse

Government mechanisms should maximize the amount of open data, improve the value and quality of released data sets, transform data formats into structured data, open format data, data readable by technological devices and application programming interfaces. On the other hand, a transparent decision-making mechanism should be adopted to increase the dissemination of actionable data. At the same time, the principles related to the permitted and safe distribution of government data must be established, and special regulations and authorizations for access to databases must be adopted. The private sector should be encouraged to participate in providing innovative value-added data services in order to promote data circulation and reuse.

- Support and acceleration of the digital transformation of the industry, especially "smart" specializations”

In order to deepen the integration of software and hardware technologies in the acceleration of digitization, the digital transformation of industries and the implementation of innovative solutions, ICT development, innovative research on the use of "cloud" platforms, digital tools and big database analytics should be systematically supported. On the other hand, the integration of international standards of intelligent applications, the development of the main mandatory measurement and testing technologies in cooperation with the relevant institutes should also be accelerated. In particular, smart specializations should be supported, based on the smart specialization strategy adopted by the government of Kosovo.

- Development of a communication channel with flexibility and scalable approach for secure communication and data exchange between different agencies

In order to provide a safe and reliable data exchange environment for government agencies, various institutions, universities and research institutes, the communication channel should be developed based on research and the latest scientific achievements in the field of data protection and security and in the already adopted laws and regulations.

- Empowering the broad and industrial opinion for the implementation of digital services

The government should in a planned and integrated way support the implementation of digital services in various fields such as: Health – supporting and promoting the implementation of the latest technologies in health services as a whole from diagnostics, operational actions and integrated management of the database at all three levels of the health service; Finance - integrating resources for building a sound financial environment and harmonizing financial laws and regulations; Agriculture – increasing digitization and promoting the transformation of production and marketing strategies; Higher education – increasing the capacities of scientists and doctoral studies and research in the field of ICT, especially in cyber security and increasing investments in scientific research in these fields; Judiciary – using the latest digital technologies to increase efficiency and transparency in law enforcement.

- Building a secure and sound network of next-generation mobile communication technologies

The government should draft regulations and practices to supervise the cyber security of next-generation networks (5G or next generation) and establish cyber security testing laboratories to verify the feasibility of law and regulations and assist industries in completing of protection and cyber security of their network. In addition, an environment for the application and vertical development of 5G or next-generation networks should be created, promoting the integration and coordination of applications to facilitate cooperation between multiple parties, and at the same time, laws and regulations for the promotion and development of 5G vertical and next-generation applications should be reviewed.

- Application of advanced digital technologies for monitoring environmental changes and real time data transmitting

In order to strengthen the ability of early warning and early detection of disasters, it is necessary to: Develop "smart" environmental monitoring technology; Develop "smart" technology for fire prevention; Develop and implement new technologies to strengthen the functions of inspection and monitoring of transport participants; Develop artificial intelligence sensor technologies for monitoring water and air quality; Carry out continuous environmental pollution studies and research and to apply digital technologies for pollution characterization, pollution identification and source identification.

- Strengthening government capacities for digital management

For the creation of new public service experiences in the use of digital technologies, the government should support programs to promote intelligent public services and the use of advanced technologies, offering courses at all levels of education, and find ways to educate the broad opinion on the use of these technologies.

The national program in the field of digitization, which is to be implemented by ministries and government agencies, contains 6 goals, 10 areas of expected impact followed by areas of intervention and scientific research activities of this priority, as shown in Table 11.

The expected impacts and the impact of the Digitalization priority area on other priority fields are presented in the following Table 11 and 12.

Table 11. Overview of expected impacts of intervention areas and scientific research activities

| Priority 6. Digitalization | | | |
|---|---|---|---|
| **Expected impacts** | **Areas of intervention and priority scientific research activities** | **Implementation responsibility*** | **Funding provision**** |
| **Encouraging university-research institute cooperation with a serious program for cultivating talents in the field of digitization** | ● Establishment of research institutes within universities;<br>● Development of joint study programs for raising human capacities and cultivating talents in the field of ITRD. | HEI/SRI, MESTI | GK/IC |
| **Recommendation for HEIs in the development of study programs in the field of digital technologies, especially in general subjects for innovative interdisciplinary talents that have international cooperation** | ● Ensuring the operation of the scientific research - innovation - industrial application chain;<br>● Ensuring acceleration of the applicability of patents in the industry;<br>● Integration of intensive courses from digital technology, for training in the use of digital practices. | HEI/SRI, MESTI | HEI/ SRI/MESTI/ |
| **Building an environment and infrastructure for data protection and privacy** | ● Development of encryption technologies and construction of server rooms by international ISO standards;<br>● • Reinforcement of the control mechanisms of the physical security of the environment and the security of the communication network in the server rooms;<br>● • Creation of the environment for the permanent storage of data as well as backup). | MIA/IPA | GK |
| **Promoting open data and data reuse** | ● Maximizing open data, improving the value and quality of released data sets;<br>● Adoption of a transparent decision-making mechanism for the distribution of applicable data;<br>● Approval of special regulations and authorizations for access to databases. | GK | |
| **Supporting and accelerating the digital transformation of the industry, and in particular "smart" specializations** | ● Deepening the integration of software technologies; ICT development system support;<br>● Accelerating the embedding of international standards of smart applications;<br>● Development of technologies and procedures of mandatory measurements and tests in cooperation with the relevant institutes;<br>● Support for smart specializations;<br>● Engaging the academic community from the field of engineering and ICT in supporting industries for the establishment and advancement of ITRD sectors, as a bridge for industry-academia cooperation, and the creation of partnerships for competition in international funds for science, innovation and sustainable development. | HEI/SRI, Industry, MESTI, MED | GK/Industry |
| **Establish a communication channel with flexibility and scalable approach for secure communication and data exchange between different agencies** | ● Building the communication channel on the latest scientific achievements in the field of data protection and security between government agencies, various institutions, universities and research institutes;<br>● Drafting of laws and regulations for authorized access to databases. | GK | GK/IC |
| **Empowering the general and industrial opinion for the implementation of digital services** | ● Planned and integrated implementation of digital services by the Government;<br>● Implementation in healthcare by supporting and promoting the latest technologies in health services;<br>● Implementation in finance by integrating resources for building a sound financial environment and by harmonizing financial laws and regulations;<br>● Implementation in agriculture by increasing digitization and promoting the transformation of production and marketing strategies;<br>● Implementation in higher education by increasing investments in scientific research in the field of cyber security;<br>● Implementation in the judiciary by applying digital technologies | GK, MoH, MED, MF, MAFRD, MESTI, MoJ, | GK |

| Priority 6. Digitalization | | | |
|---|---|---|---|
| **Expected impacts** | **Areas of intervention and priority scientific research activities** | **Implementation responsibility*** | **Funding provision**** |
| | to increase efficiency and transparency in law enforcement. | | |
| **Building a secure network of next-generation mobile communication technologies** | ● Setting up regulations and practices of cyber security supervision of 5G and future generations networks;<br>● • Creation of the cyber security testing laboratory (related to Objective 6.);<br>● • Creating the environment for the vertical application and development of 5G and future generations networks;<br>● • Promotion and coordinated integration of applications;<br>● • Review of laws and regulations for the promotion and development of next-generation vertical network applications. | MED, MESTI | GK/Industry/IC |
| **Application of advanced digital technologies in monitoring environmental changes in real time** | ● Strengthening the capability in early warning of disasters;<br>● Development of "smart" environmental monitoring technology;<br>● Development of "smart" technology for fire prevention;<br>● Development and implementation of new artificial intelligence technologies for transport inspection and monitoring;<br>Development of artificial intelligence sensor technologies for water and air quality monitoring;<br>● Continuous study of environmental pollution and the application of digital technologies for the characterization, identification and source of pollution. | HEI/SRI, MESTI MoD, MESPI | GK/IC |
| **Strengthening government capacities for digital management** | ● Supporting programs for the promotion of intelligent public services and the use of advanced technologies;<br>● Offering courses at all levels of education;<br>● Educating the general public in the use of digital technologies. | GK | GK |

* HEI = Higher Education Institutions; SRI= Scientific Research Institutes; Industry = Various Corporations; MESTI = Ministry of Education, Science, Technology and Innovation; MoD = Ministry of Defence, MIA = Ministry of Internal Affairs; MAFRD= Ministry of Agriculture; MED= Ministry of Economic Development; MESPI = Ministry of Environment, Spatial Planning and Infrastructure; MoJ = Ministry of Justice; MH = Ministry of Health; IPA = Information and Privacy Agency; ** GK = Government of Kosovo; IC= International Cooperation;

Table 12. General description of cross-priority and cross-sectoral complementarities

| Digitalization | |
|---|---|
| **Priority** | **Relevant expected impact of the priority** |
| 1. Health | ● Empowerment of the broad opinion for the implementation of digital services in health;<br>● Increasing the efficiency and quality of health services;<br>● Planned and integrated implementation of digital services by MoH;<br>● Implementation in the various fields of health by supporting and promoting the latest technologies in health services. |
| 2. Society, education, culture, economy and social sciences and humanities | ● Encouraging cooperation between universities and research institutes supported by a serious program for cultivating talents in this field;<br>● Strengthening and development of public/private universities and internationally competitive research institutes with new scientific, social, cultural and economic values;<br>● The establishment of research and innovation infrastructure, the increase and internationalization of scientific research activity;<br>● Strengthening government capacities for digital management. |
| 3. Natural resources, energy, environment and climate change | ● Application of advanced digital technology to monitor environmental changes;<br>● Transmission of monitoring data in real time;<br>● Strengthening the capability in early warning of disasters;<br>● Development of "smart" environmental monitoring technology;<br>● Development of "smart" technologies for fire prevention;<br>● Development and implementation of new technologies for transport inspection and monitoring;<br>● Development of artificial intelligence sensor technologies for water and air quality monitoring;<br>● Continuous study of environmental pollution and the application of digital technologies for characterizing, identifying and assigning the source of pollution. |
| 4. Agricultural production, food and bioeconomy | ● Ensuring the implementation of advanced digital technologies in promoting the transformation of agro-industrial production;<br>● The use of digitization and communication networks for the development of marketing strategies;<br>● Provision of an effective and integrated digital data management system.<br>● Development of new innovative digital technologies with impact on circular economy and ecosystem related to Priority 4;<br>● Ensuring an effective system of functional environmental observation from the database for monitoring water and air quality. |

| Cross-sectoral priority | Relevant expected impact of the priority |
|---|---|
| 5. Green Deal | ● Development and delivery of specific programs for the integrated implementation of digitized systems in support of the multidisciplinary Climate Change Competence Framework covering the main areas of the Green Deal. |

# 5. Internationalization according to Kosovo's national scientific and development priorities

The globalization of science is a process that has intensified significantly in the last two decades in Europe. Such a process enjoys great attention especially from the introduction of the Bologna Process and the European Qualifications Framework, which has led to the freeing from administrative and academic obstacles to the movement of students, teaching staff and researchers. The various mobilities and collaborations within European programs such as CEEPUS, Horizon and Erasmus + have encouraged the process of internationalization of scientific activities, resulting in an accelerated development of scientific research and a general increase in the quality of university education. Therefore, the internationalization of science and research activity in Kosovo represents a strategic goal for their development.

Kosovo participates in European mobility schemes such as the Central European Exchange Program for University Students CEEPUS, Erasmus +, and from 2021, it is part of the Horizon Europe program. Kosovo also benefits from various forms of bilateral and multilateral support. However, the opportunities for the mobility of staff and students from Kosovo remain limited and far behind other countries in the region and the EU. The internationalization of science and education in Kosovo, although it is an urgent necessity, is still far behind the institutions from the countries of the region as well as the European ones.

The NSP aims at effective inclusion of Kosovo's scientific institutions in ERA, other international programs and capacity building for greater use of international support instruments. At the same time, NSP aims to create framework conditions and a networked system with other international scientific institutions that attract high quality professionals from all over the world. A key mechanism through which NSP aims to increase and internationalize science in Kosovo is cooperation with Kosovar researchers abroad.

In the framework of the NSP and the main objectives with internationalization, it is aimed to create the conditions for:

- Open Science to improve research quality, efficiency and accountability

Improving the management and effective financing of a national Open Science ecosystem will ensure the development of coherence with international standards where national structures and infrastructures through Open Science will promote their integration in international networks and infrastructures. Introducing a modern approach to the evaluation of scientific research in accordance with Open Science coincides with the principles and guidelines of the European Research and Innovation Area and ensures that the results of scientific research are recognized internationally. The creation of a national Open Science community is necessary for Kosovo to promote the development of science and the involvement of the public in scientific research. Further, Kosovo will need a functional State Council of Integrity in research and innovation, which would ensure ethical standards in scientific activity in Kosovo (example according to COPE- Committee on Publication Ethics), gender equality and the inclusion of marginalized groups. Also create a database that would respond to the OECD Frascati Manual[43] and data collection and provide a comparative analysis of innovation performance using the indicators of the European Innovation Scoreboard. This procedure helps Kosovo assess the strengths and weaknesses of the NSP objectives and identify the challenges that need to be addressed.

- Increasing mobility of researchers, professors and students

The increase in international mobility of researchers, staff and students for several years has been a trend that has marked interest in higher education. All quality higher education institutions have recognized internationalization as one of the main mechanisms not only for increasing the quality of study programs, but also for increasing the quality of education as a whole. Although the financing of the mobility of students and teaching staff has been integrated into the system through mobility programs such as ERASMUS+ and CEEPUS, the analyses have shown that the number of mobilities in Kosovo is low. However, it should be noted that most of the semester mobility was carried out within the framework of ERASMUS+ and that Kosovo cannot decide to increase the quota independently because within this program it depends on the invitation and application of the European partners without having the right of direct application.

[43] OECD, 2015. Frascati Manual. https://www.oecd.org/innovation/frascati-manual-2015-9789264239012-en.htm

Following the example of other European countries, Kosovo will introduce scholarships for researchers and foreign students of postgraduate programs, which should be based on bilateral agreements between higher education institutions and other collaborations. This will lead to an increase in the overall number of PhD students and post-doctoral researchers (as well as lead to increased competition) and to increased international cooperation and research quality. Scholarships should also be allocated to Kosovo students who register to study in doctoral programs abroad, but which also includes an obligation to return to Kosovo after obtaining their doctoral degree. Finally, there is a need to increase bilateral cooperation agreements financed by the Kosovo science fund and foreign partners.

Special attention should be paid to providing international study visits for young Kosovo researchers and to ensure the continuity of research careers in Kosovo's higher education institutions and research institutes. Grants will also be available for study visits to Kosovo by prominent Kosovar scholars from the diaspora, employed in recognized institutions of higher education abroad. During such study visits, they will transfer their knowledge to their colleagues in Kosovo, influence the system of organizing scientific and scientific learning activity in their host institutions, and create long-term connections. Teaching staff and Kosovar scientists from the diaspora involved in mobility to Kosovo should not be treated like other foreign workers employed in the country. Since these cadres contribute significantly to the development of science, the administrative procedures related to their entry and stay should be facilitated as much as possible. Through such schemes, Kosovo will strengthen the promotion of cadres from the country and the diaspora and will increase the cooperation network by making them an integral part of the KRIS platform (Kosovo Research Information System) or KREN (Kosovo Research Education Network).

Empowerment and financing of such experience exchange programs strengthens the participation of Kosovar researchers and institutions in the Horizon Europe program (ESS, EOSC, EuroHPC), in particular in the EuroHPC Joint Undertaking and the inclusion in the 11th round of the European Social Survey.

• Encouraging the creation of double and joint study programs with higher education institutions from Europe and the world

Dual and joint programs enable higher education institutions to join a particular program and lead to an increase in the overall quality of study. In this form, educational institutions in Kosovo should join this trend based on their strategic goals. International cooperation in the form of double and joint study programs can be particularly important for smaller engineering universities as specialization in certain scientific fields is particularly relevant for this type of institution.

HEIs/research institutes and MESTI should develop a strategy for the employment of foreign researchers and teachers in higher education institutions and research institutes. The Human Resources Plan must be updated annually, showing a real percentage of foreigners involved in the teaching process and research activities from 2023 and determine the jobs for foreign staff as researchers and teachers. Also, as part of the strategy, universities should offer as many programs and activities in foreign languages as possible. The annual fund should increase by 20% of the institutions' budget to stimulate this cooperation. The increase of the budget should be determined based on the performance in projects, the number of mobilities and scientific activity.

## 6. Implementation, Monitoring and Evaluation

The implementation of the national science program is the responsibility of the Ministry of Education, Science, Technology and Innovation (MESTI) through the National Scientific Research Agency (NSRA), (LSRA-Article 48), the scientific council of MESTI and Higher Education Institutions (HEIs), Scientific Research Institutes (SRI), enterprises and other governmental and non-governmental departments that deal with, or implement the results of scientific research and innovation.

MESTI, in consultation with the line ministries, based on the request of the NSC, establish an Inter-Institutional Monitoring Coordinating Body (IMCB) for regular monitoring of the implementation of the NSP. IMCB in cooperation with MESTI and the responsible Ministries based on the request of the NSC, as well as in cooperation with other experts, prepares a periodic analysis of the achievements of strategic objectives and priorities, analyzes risk factors and updates measures to manage and mitigate their eventual negative impacts. In this context, a system of indicators and standard analytical indicators should be developed that evaluate the

strengths and weaknesses during the implementation of the NSP and the progress achieved. After a thorough analysis related to the implementation of the NSP and the report received from the IMCB, the NSC reports on an annual basis on the implementation of this program to MESTI, the Government of the Republic of Kosovo and the Assembly of the Republic of Kosovo. The main tasks of IMCB are as follows:

- Establishing an effective monitoring mechanism and reporting in accordance with monitoring requirements should ensure the implementation of the NSP.
- Collection of relevant information and indicators on the implementation of the NSP that ensure the development and internationalization of scientific research activity.
- Preparing regular annual reports on the implementation of the NSP and notification of the stakeholders on the results of the monitoring process.
- Initiating discussions about problematic issues that are identified during the monitoring process, if necessary.
- Publication of regular reports on the website of the NSC, MESTI and the Assembly of the Republic of Kosovo,
- Final evaluation based on the analysis of the monitoring process. With the approval of the NSC, the IMCB may, if necessary, undertake interim reviews/monitoring and evaluations of all or part of the NSP.
- Updating the NSP action and implementation plan based on the results of the analysis and evaluation from the monitoring process.

The Interinstitutional Monitoring Coordinating Body will consist of representatives of:

1. MESTI (one member);
2. Line Ministries (one member each);
3. NSP implementing institutions (one member);
4. Ministry of Finance (one member);
5. The Office of Strategic Planning of the Government of Kosovo (one member);
6. Civil society organizations (one member);
7. Other relevant institutions (one member).

IMCB for its activities engages field experts as needed.

### 6.1. Indicators for monitoring the effectiveness of NSP implementation

The process of the NSP monitoring and evaluation is based on a certain number of indicators compatible with the European structure - European Innovation Scoreboard 2021 (EIS in 2021[44]) in which Kosovo intends to join in 2024, also with indicators extracted from the KRIS platform directly related to the objectives of the NSP. The process of is based on 4 groups, 7 areas and 53 indicators.

Table 13. Group, areas and indicators of the NSP monitoring and evaluation

| **Group of evaluation and monitoring indicators** | **Evaluation and monitoring area** | **Evaluation and monitoring indicators** |
|---|---|---|
| **General Framework** | Institutional research capacity | Number of research institutions, by type of legal entity and research field |
| | Human resources | Number of researchers in a research institution in total and by age, gender, educational level, research title, public/private institution and research/scientific field |
| | | Number of research and development employees in public and private research institutions, by age, gender, research/administrative role and research field |
| | | Researchers by research institution and educational level by type of affiliation (full-time/part-time), gender and research field |
| | | Number of researchers under 35 years old |
| | | Publication of scientific articles in international journals, by institution, gender, research title and research field |

[44] EC, 2021. European Innovation Scoreboard 2021 – Methodology report: https://ec.europa.eu/docsroom/documents/45971

| Group of evaluation and monitoring indicators | Evaluation and monitoring area | Evaluation and monitoring indicators |
|---|---|---|
| | | Number of supervision of post-doctoral research work, by institution, gender, research field |
| | | Number of PhD students, by gender, age, institution, research field, local/international |
| | | Number of doctoral students/post-doctoral students, by gender, age, institution, research field, local/international |
| | | Number of researchers from the diaspora, by gender, age, relevant institution, educational level, research title and scientific field |
| | | Number of researchers who are not connected/affiliated with a research institution, by gender, age, educational level and scientific field |
| | | Number of retired researchers, by gender, age, educational level, scientific title and scientific field |
| | Internationalization of scientific research | Publication of scientific articles in international journals, by institution, gender, research title and research field |
| | | International publications by institution, publication type, gender, research title, research field |
| | | Publication of scientific articles in local journals, by institution, gender, research title and research field |
| | | Local publications by institution, publication type, gender, research title, research field |
| | | List of journals, by affiliation of the institution and research field |
| | | Joint international scientific publications in international and local journals broken down by institution, researcher and research field |
| | | Research projects coordinated by the institution, their financial value and source of funding |
| | | Research projects where the institution participates as a partner and their financial value and source of funding |
| | | Number of mobilities (doctoral student/post-doctoral student/academic staff/other researchers) inside the country and abroad |
| | | The number of international scientific gatherings |
| | | Mobility of researchers, by institution, gender, scientific field, entry/exit, educational level, scientific title |
| | Digitalization | Number of computer subscriptions/networks |
| | | Virtual infrastructure (Electronic library; research software, international databases, etc. |
| | | Institutions that provide training to develop or improve the ICT skills of their staff |
| | | Number of individuals who have responsibilities over the digital basis and employed ICT specialists |
| **Investment** | Funding and support | Expenses for research activity per research institution and research area |
| | | Classification of all funds allocated annually by funding source, type of project contract, scientific field and institution |
| | | Funding measures and types |
| | | Nationally funded projects, per institution and their financial value |
| | | Internationally funded projects, per institution and their financial value |
| | | Investments in start-ups, spin-offs and other business research activities |
| | | Direct government funding and government support and tax relief for business research and development |
| | | Investments in scientific research infrastructure/ Type of research equipment by research institution and research field |
| | | Investments in scientific research infrastructure/Surface/space designated for research, per research institution and research area |

| Group of evaluation and monitoring indicators | Evaluation and monitoring area | Evaluation and monitoring indicators |
|---|---|---|
| | | Research infrastructure, by type, institution and research area |
| | R&I investments in industry | Investments in R&I in partnership with research institutions/industry |
| | | Technology transfer costs |
| | | Number of employees from innovative activity |
| **Innovative Activities** | Innovation | Enterprises (by size) with innovative products and services |
| | | Enterprises (by size) in innovative partnership with academia |
| | | Joint publications with the industry and other beneficiaries (analyses, publications...) |
| | | Number of doctoral students from professional programs. |
| | | Number of mobilities (per research and innovation) |
| | | Number of innovative projects |
| | Intellectual assets | Number of IPs generated by scientific research / number of registered patents per researcher, research institution, research area |
| | | Patent and trademark applications |
| **Impact** | Impact on employment | Employment in research and innovation institutions |
| | | Number of new jobs generated by scientific research activities |
| | Development of priority/cross-priority areas | Number of publications by fields |
| | | Number of projects financed under NSP and international programs |
| | | Application of new technologies derived from scientific research |

# 7. Implementation Plan

## 7.1. Activities plan and schedule

The following table presents the implementation schedule of the main steps that must be taken to implement this National Science Program for the identified research priorities. It links each activity to an overall objective and indicates responsibility, duration, required resources and budgets.

Table 14: Objective 1

| Measure | Activity | Start date | Duration | Resources and budget | Responsibility |
|---|---|---|---|---|---|
| **1.1** | **1.1.** Review of laws.<br>**1.1.1.** Review of the law on scientific research activity.<br>**1.1.2.** Review of the law on higher education.<br>**1.1.3.** Review of the law on innovation, transfer of knowledge and technology.<br>**1.1.4.** Review of the Patent Law.<br>**1.1.5.** Supplement/amendment of the finance law in relation to S&R activity (VAT and procurement).<br>**1.2.** Issuance of AI derived from the amendment of the aforementioned laws.<br>**1.3.** Creation of an integrated legal base system including the four basic laws which strengthens the role of scientific research in all HEIs/Scientific research institutes.<br>**1.4**. Issuance of by-laws as well as preparation of necessary documents for evaluation, in comparative terms, of the state of scientific research and technological activity as well as the degree of NSP implementation | March 2023 | December 2025 | 0 | MESTI, Assembly, MIET, MFT |

| | | | | | |
|---|---|---|---|---|---|
| **1.2.** | **1.2.1** Drafting of professional standards for ethics during scientific research, in compliance with European standards.<br>**1.2.2** Promotion of standards for integrity and ethics in scientific research and innovation and their monitoring at the state level. | March 2023 | December 2028 | €10.000 (2023) | Higher education institutions and research institutes, MESTI |
| **1.3.** | **1.3.1.** Development of quality assurance mechanisms that link institutional operation efficiency with increased performance.<br>**1.3.2.** Active participation of all actors within the HEI/Scientific Research Institutes in proposing the most optimal solutions in terms of performance enhancement. | March 2023 | December 2028 | 0 | MESTI |
| **1.4.** | **1.4.1**. Functionalization and sustainability of KRIS platform (Kosovo Research Information System).<br>**1.4.2**. Capacity development for the collection, maintenance and administration of data relevant to the licensing process of research and innovation institutions in Kosovo (within the KRIS platform).<br>**1.4.3.** Capacity development for the for the collection, maintenance and administration of data and the implementation of the National Science and Innovation Fund (within the KRIS platform) in the respective schemes as well as other modules that focus on the repository and regulation of the innovation field. | March 2023 | December 2028<br><br>Maintenance<br><br>Training<br><br>Modules | €1.500x12=€18.000<br><br>€ 10.000 (2023)<br><br>€ 5.000<br><br>€ 50.000 | MESTI |
| **1.5.** | **1.5.1.** Creation and support of the continuous measurement system of research performance indicators in the HEIs.<br>1.5.2. Establish research performance scores (RPS) and financial support of HEIs for best performance. | March 2023 | December 2028 | 0 | MESTI |

Table 15: Objective 2

| **Measure** | **Activity** | **Start date** | **Duration** | **Resources and budget** | **Responsibility** |
|---|---|---|---|---|---|
| **2.1** | **2.1.1.** Consolidation and development of doctoral programs in HEIs in Kosovo, preferably in cooperation with established institutions of higher education and science from other countries. Doctoral programs that conclude with the granting of double degrees will have priority in financial support, for S&R infrastructure, mobility, co-mentoring. In principle, existing doctoral programs will also be able to benefit from this opportunity.<br>**2.1.2.** Participation in international projects in which the development of joint doctoral programs with European partners and beyond is envisaged.<br>**2.1.3.** Financial support for increasing the critical mass of academic staff with potential for coordination in scientific projects through international collaborations with the academic diaspora. | March 2023 | December 2028<br><br>2 PhD programs<br><br>2 applications the first year<br><br>10 grants | € 50.000 x 2=100.00 per year<br>€ 10.000 x2=€ 20.000<br><br>€ 30.000 if support<br><br>In the first year, while this will increase in the other years.<br><br>€10,000 per researcher<br><br>€100,000 the first year | HEI, MESTI |
| **2.2.** | **2.2.1.** Financial support for the participation of female researchers in post-doctoral programs at centers of excellence worldwide. Preference should be given to candidates whose research leads to publications in recognized international journals.<br>**2.2.2.** Revising procedures for selection/advancement to academic ranks in HEIs and research institutes, giving preference to candidates with post-doctoral studies at top-ranked universities. | March 2023 | December 2028<br><br>20 scholarships per year | 2.000x12 (month)= 24.000<br><br>x20 scholarships= €480.000<br><br>In the first year, while this will increase in other years.<br>0 | Universities, research institutes, MESTI |
| **2.3** | **2.3.1.** Support for doctoral studies in the priority and deficit fields of researchers in HEIs of Kosovo, as well as support for candidates pursuing their studies in prestigious universities in the world. (top 1000 according to QS World University Ranking). | March 2023 | December 2028 | €20.000 per scholarship per year | HEI, MESTI |

| | | | | | |
|---|---|---|---|---|---|
| | **2.3.2.** Full financial support for doctoral students for participation in scientific conferences as well as the publication of scientific articles in open access journals. | | 20 scholarships<br><br>50 schemes | €400.000 (2023)<br><br>€1.000 per year for doctoral students<br><br>€50.000 per year | |
| **2.4.** | **2.4.1**. Support for short-term mobility of Kosovar researchers in university and research-scientific institutions of other countries.<br>**2.4.2**. Enhancing, advancing the criteria for selection/advancement procedures in academic ranks in HEIs and scientific institutions, including mobility contribution at the post-doctoral level. | March 2023 | December 2028 | €2.000 x 10= 20.000 per person<br>20 scholarships Total= € 400.000<br><br>20 Mobilities per year<br><br>0 | HEI, MESTI |
| **2.5.** | **2.5.1**. Support for semester or annual stays of Kosovar researchers in university and scientific research institutions abroad. Such a move should lead to joint scientific publications and strengthening of cooperation between the domestic and host institutions.<br>**2.5.2**. Review of statutes and procedures for election/advancement to academic ranks in HEIs and scientific institutes, including mobility contribution | March 2023 | December 2028<br><br>20 semester stays per year | €2.500 month)= 25.000 per person x20 scholarships= €500.000 per year<br><br>0 | HEI, MESTI |
| **2.6.** | **2.6.1.** Support of the administrative staff, as a critical measure for the realization and support of the research work. | March 2023 | December 2028 | 10% with participation in realized projects | HEI, MESTI |

Table 16. Objective 3

| **Measure** | **Activity** | **Start date** | **Duration** | **Resources and budget** | **Responsibility** |
|---|---|---|---|---|---|
| **3.1.** | **3.1.1.** Establishment of the National Research Infrastructure Fund - to channel government funding for laboratories and equipment for scientific research and innovation based on reasonable needs and national science priorities.<br>**3.1.2.** Inventory and valorisation of current laboratories – Mapping the current research and innovation infrastructure in Kosovo and creating a public database with information on laboratory equipment and manner of access to research or development projects. | March 2023 | December 2028<br><br>Funding for 3 Laboratories to be operational | For each laboratory € 500.000<br><br>€ 1.500,000 in 2023 | MESTI, HEI, SRI |
| **3.2.** | **3.2.1.** Support for publications in open access high ranked journals.<br>**3.2.2**. Provide access to e-libraries for all relevant institutions in Kosovo according to the scientific field. | March 2023 | December 2028<br><br>100 papers with open acces<br><br>Annual subscription and pass | Up to €1.500 per paper<br><br>€150.000 per year, increases in other years<br><br>€ 200.000 | MESTI, HEI, SRI |

| | | | | | |
|---|---|---|---|---|---|
| **3.3** | **3.3.1.** Provision of online study spaces and equipment.<br>**3.3.2.** Subscription to computer hardware/software for data analysis. | January 2023<br><br>1 per year | December 2028<br><br>5 units per year | € 50.000 per unit<br>€250.000 (2023)<br><br>€50.000 | MESTI, HEI, SRI |
| **3.4.** | **3.4.1.** Establish the institutional base for open access to scientific research infrastructure for researchers in Kosovo. | March 2023 | December 2028<br><br>Software<br><br>5 trainings per year<br><br>5 innovative researches | € 20.000<br>X 20 units<br>€ 400,000<br>(2023)<br><br>€ 5.000 per training<br>€25.000<br>(2023)<br><br>€10.000 x 5=<br>€50.000<br>(2023) | HEI, MESTI, Scientific research institutes, etj. |
| **3.5.** | **3.5.1.** Establishment of the State Interdisciplinary Institute for Science and Technology that is related to Objective 6.<br>Feasibility study in the first phase.<br>**3.5.2.** Stimulating and supporting partnerships with scientific institutions in the region and Europe to support the green transition. | March 2023 | December 2024 | €30.000 | HEI, MESTI |
| **3.6** | **3.6.1**.Provision of spaces and digital devices for data storage and management.<br>**3.6.2.** Creation of integrated data bank (data banking) for specific fields.<br>**3.6.3.** Enhancing human capacities for the storage and management of integrated data according to detailed objectives in the digitalization area (within Objective 6. | March 2023 | December 2023<br><br><br><br><br><br>3 partnerities | €500.000<br><br><br>€30.000<br><br><br>€5.000 per partnerity<br>€15.000 (2023) | MESTI/ relevant ministries |

Table 17. Objective 4

| **Measure** | **Activity** | **Start date** | **Duration** | **Resources and budget** | **Responsibility** |
|---|---|---|---|---|---|
| **4.1.** | **4.1.1.** Development of the framework for international scientific cooperation (Horizon Europe, MSCA, ERC, et.).<br>**4.1.2.** Development of bilateral agreements for the strengthening of SR&I activities, with a focus on strategic cooperation for both parties to the agreement. | March 2023<br><br>Implementation to be added to the text | December 2028<br><br>Until agreement | 0<br><br>€100.000 (2023) | MEST/HEI/ SRI MFAD |
| **4.2** | **4.2.1**. Set up a database for the academic diaspora (Special module in KRIS).<br>**4.2.2.** Development of conditions and regulations for the engagement of the academic diaspora in scientific institutions in Kosovo.<br>**4.2.3** Supporting the mobilities of the academic diaspora in universities and scientific institutes in Kosovo.<br>**4.2.4.** Support of scientific projects in partnership with the academic diaspora, in the scientific fields identified in this National Science Program. | March 2023 | December 2028<br><br><br>Payment per Mobility € 2,000<br><br>15 mobilities the first year | € 20.000<br><br>€ 300.000 Total<br><br>€30.000 x 5<br>€ 150.000<br>(2023) | MESTI/HEI/ SRI/MFAD |

| | | | | | |
|---|---|---|---|---|---|
| | | | Grant scheme €30.000 | 20.000 € x 10 € 200.000 | |
| **4.3.** | **4.3.1** Establishment of a special fund for research mobility abroad under international programs.<br>**4.3.2** Support for international mobility for students of doctoral programs to ensure the brain return and increase the employment opportunities of the beneficiaries.<br>**4.3.3** Support for international mobility for researchers and scientific workers engaged in universities, institutes and other institutions active in scientific research work - for the purpose of publication in high-ranked journals according to specific fields or/and the preparation of applications for grants under the Horizon Europe program and other international SR&I grants.<br>**4.3.4** Support of small 6-month scientific projects for young researchers with high potential, as a mechanism for preparing applications for grants: Horizon Europe MSC, postdoctoral, scholarship program, etc.<br>**4.3.5** Increasing funds for researchers' mobility on an annual basis up to 10%.<br>**4.3.6** Encouraging researchers to apply for international mobility funds (Erasmus+, Horizon Europe, MSC, etc.).) | March 2023<br><br>Doctoral students enrolled with HEIs of Kosovo<br><br>Performance chart | December 2028<br>20 mobilities per year.<br><br>20 mobilities per year.<br><br>10 projects in the first year<br><br>30 applications per year | €1.800 x6 Months<br>€ 10.800 x20= €216.000<br><br>€1.800 x6 Months<br>€ 10.800 x20= €216.000<br><br>50 researchers €100.000 (2023)<br><br>€10.000 per project €100.000 for (2023)<br><br>€1.500 per applicant €45.000 per year | MESTI / HEI / SRI |
| **4.4** | **4.4.1** Support for participation in international scientific research networks, especially in the European RTD Framework Program and COST and stimulating the staff to publish with other international institutions. | March 2023 | December 2028 | €350.000 year | MESTI |
| **4.5.** | **4.5.1** Establishment of the Center for training and preparation of scientific and innovative project proposals at the international level (such as Horizon Europe and other international projects).<br>**4.5.2.** Creation of the support fund for the development of local expertise for applications to international projects.<br>**4.5.3.** Strengthening of National Contact Points (NCP) for the provision of services and support for the implementation of Horizon Europe scientific grants.<br>**4.5.4.** Creation of international partnerships for applications to scientific projects. | March 2023 | December 2025 | € 500,000 (2023)<br>€ 500,000 (2024<br>€ 1.000,000 (2025)<br><br>0 | MESTI/Traini ng centre |
| **4.6.** | **4.6.1.** Strengthening Publications Support Programs with 10% annual growth. | March 2023 | Redefining for local magazines | €50.000 per year | MEST |
| **4.7.** | **4.7.1.** Encouraging HEIs to form joint international doctoral programs with leading international institutions. | April 2023 | One program 50.000€<br><br>5 programs | €250.000 year | HEI/KAA |

Table 18. Objective 5

| **Measure** | **Activity** | **Start date** | **Duration** | **Resources and budget** | **Responsibility** |
|---|---|---|---|---|---|
| **5.1.** | **5.1.1.** Organization of professional doctorates in accordance with the law and the needs of the country.<br>**5.1.2.** Strengthening the activity of industrial boards in universities and scientific research institutes. | March 2023 | December 2025 | €50.000 one doctorate (2023)<br>0 | HEI- Scientific research institutes. |
| **5.2.** | **5.2.1.** Financing of start-ups and spin-offs, enterprises based on scientific research.<br>**5.2.2.** Establish a financial support scheme for joint application between universities and industry for scientific projects.<br>**5.2.3**. Allocation of subsidies to support scientific and innovative research projects.<br>**5.2.4.** Supporting the creation of scientific and technological centers/parks. | March 2023 | December 2027<br><br>Start-up &Spin off<br><br>Subsidies for 10 centers | €500.000 (2023)<br><br>1.000.000 (2023) | MEST, MTI, MFT and businesses |

| | | | | | |
|---|---|---|---|---|---|
| | | | 10 grants/year | € 200.000/year | |
| **5.3.** | **5.3.1.** Financial support scheme for applicants who have proven successful in Horizon Europe projects with industry. | March 2023 | December 2028 | 3x €10.000<br>€30.000<br>(2023) | MESTI |
| **5.4.** | **5.4.1.** Set up knowledge transfer centers.<br>**5.4.2.** Financial incentive package for the development, patenting and commercialization of patents. | March 2023 | December 2025 | €500.000<br>(2023)<br>€25.000 for 1 package | MESTI, MTI, MFT |

Table 19. Objective 6

| **Measure** | **Activity** | **Start date** | **Duration** | **Resources and budget** | **Responsibility** |
|---|---|---|---|---|---|
| **6.1** | **6.1.1.** Establishment of the State Interdisciplinary Institute for Science and Technology.<br>**6.1.2.** The establishment of laboratories for interdisciplinary studies with advanced equipment with defined strategies and harmonized with the priority areas within the institute.<br>**6.1.3.** Providing funds for the scientific research that will be carried out in this institute. | January 2024 | December 2026 | €3.000.000<br>(2024)<br>€ 1.250.000<br>(2027) | Government/ MESTI |
| **6.2.** | **6.2.1.** High-performance equipment (computer, analytical devices).<br>**6.2.2.** Employment of full-time professional staff<br>**6.2.3.** Creating legal opportunities for sustainable operation.<br>**6.2.4.** Provision of trainings for raising professional and administrative capacities.<br>**6.2.5.** Increasing the number of applied research and innovation. | March 2023 | December 2028 | €50.000<br>per program<br>€ 5.000 for training new staff in institutes | HEI, MEST, relevant ministries |
| **6.3.** | **6.3.1.**Establish interdisciplinary programs.<br>**6.3.2.** Set up a financial support scheme for scientific research and innovation in core disciplines and interdisciplinary.<br>**6.3.3.** Raising infrastructural capacities for scientific research and innovation related to the priority areas of NSP 2023. | March 2023 | December 2027<br>5 schemes | € 2.500 per scheme<br>€12.500 | MESTI |
| **6.4** | **6.4.1**. Financial support scheme for applicants who demonstrate outstanding and innovative achievements and results within the core areas. | March 2023 | December 2028 | € 20.000<br>per year | MESTI, KAA, HEI, Institutes |
| **6.5.** | **6.5.1**. Financial support for training and expertise that support monitoring and evaluation mechanisms. | March 2023 | December 2028 | € 60.000<br>per year | MESTI, KAA, HEI, Institutes |

# 8. Budget

The successful implementation of the National Science Program 2023-2028 is of particular importance not only for the development of science and innovation in the country, but also for increasing economic competitiveness and facing current challenges such as digitalization, inclusive society, the green deal, energy, health and other challenges. Therefore, in order to operationalize this program, the Government of the Republic of Kosovo, MESTI and other institutions must provide an efficient institutional framework and financial support with a well-planned budget framework, as well as budget revisions that respond to the requirements and time dynamics. In the last decade in Kosovo, investments in scientific research and innovation have been significantly lower compared to the amount foreseen according to the LSRA (Article 5).

The main challenges that must be considered during the compilation, design and implementation of the budget for the implementation of the National Science Program 2023-2028 are:

- The institutional capacity of MESTI for the processing of the planned schemes and activities, respectively the management and monitoring of the budget allocated to the potential beneficiaries and implementers of the activities;
- Absorptive capacity of potential beneficiaries to utilize schemes and funds with full accountability and transparency.

These two aspects have a significant impact on the relationship between budget planning and budget implementation. Based on the data of MESTI, there is currently a budget framework, respectively MTEF - Medium-Term Expenditure Framework for the time period 2021-2025 in a financial value of €371,683,035. In the framework of this budget planning, in addition to other activities that are dominated by financial support, there is also the scheme "Improving the Research and Innovation Environment", i.e. activities that specifically address science and research challenges with budget allocations to:

- Establish the Science Fund, foreseen in the amount of € 16,500,000 for the period 2021-2025;
- Finance the associated status of Kosovo in Horizon Europe, in the amount of € 5,000,000 for the period 2021-2025;
- Establish a special fund for the co-financing of research projects that are the result of international cooperation and for the preparation of international scientific cooperation projects in the amount of € 2,200,000 for the period 2021-2025.

During the budget planning for the implementation of the NSP 2023-2028, the funding of scientific research and innovation according to the Law on Scientific Research Activity (LSRA, Article 5) was taken as the basis and within this foreseen budget was integrated the budget scheme projected in MTEF of MESTI dedicated to scientific research activities for the period 2021-2025. Figure 8 shows the annual budget planning for the implementation of the NSP for the time period covered by this program (2023-2028).

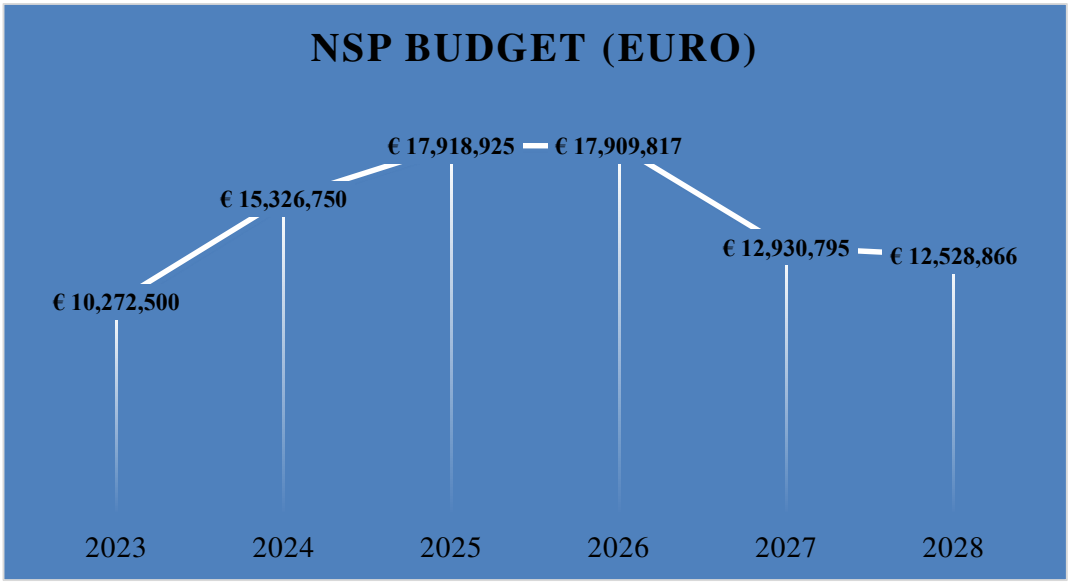


**Figure 8.** NSP budget 2023-2028.

In the following, these activities are also presented through the table on an annual basis.

Table 20. Improving the research and innovation environment 2021-2025

| Activity | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|
| Establishment of the National Science Council | | | | | |
| Drafting of the National Science Program | | | | | |
| Establishment of the Science Fund | | €2.500.000 | € 3.500.000 | € 4.500.000 | € 6.000.000 |
| Gaining associate status at Horizon Europe | € 1.000.000 | €1.000.000 | € 1.000.000 | € 1.000,000 | € 1.000.000 |
| Creation of a special fund for the co-financing of research projects that are the result of international cooperation and for the preparation of international scientific cooperation projects | | € 200.000 | € 500.000 | € 500.000 | € 1.000.000 |
| Mapping of the research infrastructure | | | | | |
| Membership in the European Innovation Scoreboard | | | | | |
| Establishment of the Innovation Council | | | | | |
| Publication of data in the field of innovation | | | | | |
| Completing the legislative framework for SR&I | | | | | |

**Source**: MESTI MTEF 2021-2025

Table 21: Budget requirements by year for activities from 2023 to 2028

| Year | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
|---|---|---|---|---|---|---|
| Total Budget | €10.272.500 | €15.326.750 | €17.918.925 | €17.909.817 | €12.930.795 | €12.528.866 |
| Development of quality assurance mechanisms. | €10.000 | €11.000 | €12,100 | €13.310 | €14.641 | €16.105 |
| Operationalization, maintenance of the KRIS platform and training. | €33.000 | €36.300 | €39.930 | €43,923 | €48.315 | €53.146 |
| Integration of new modules in the KRIS online platform. | €50.000 | €55.000 | 0 | 0 | 0 | 0 |
| Development of new doctoral programs in HEIs in Kosovo. | €100.000 | €110.000 | €121.000 | €133.100 | €146.410 | €161.051 |
| Support of applications to international projects where the development of joint doctoral programs with European and regional partners is foreseen. | €50.000 | €55.000 | €60.500 | €66.550 | €73.205 | €80.525 |
| Financial support of academic staff with mentoring potential of scientific projects through international collaborations with the academic diaspora. | €100.000 | €110.000 | €121.000 | €133.100 | €146.410 | €161.051 |
| Post-doctoral program. | €480.000 | €528.000 | €580.800 | €638.880 | €702.768 | €773.044 |
| Supporting doctoral studies in priority and deficit areas | €400.000 | €800.000 | €1.200.000 | €1.200.000 | €1.200.000 | €1.200.000 |
| Support of doctoral students for participation in conferences and publications in open access journals. | €50.000 | €55.000 | €60.500 | €66.550 | €73.205 | €80.525 |
| Support for short-term mobility of Kosovar researchers in university and research-scientific institutions in other countries. | €400.000 | €440.000 | €484.000 | €532.400 | €585.640 | €644.204 |
| Support for semester or annual stays of Kosovar researchers in university and scientific research institutions abroad. | €500.000 | €550.000 | €605.000 | €665.500 | €732.050 | €805.255 |
| Funding open access to scientific journal platforms for HEIs and research institutes. | €100.000 | €110.000 | €121.000 | €133.100 | €146.410 | €161.051 |
| Establishment of the National Research Infrastructure Fund - Inventory and valorisation of current laboratories. | €1.500.000 | €2.500.000 | €1.000.000 | €1.000.000 | €1.000.000 | €1.000.000 |
| Support for open access publications in relevant scientific journals. | €150.000 | €165.000 | €181.500 | €199.650 | €219.615 | €241.576 |
| Providing access to electronic libraries. | € 200.000 | € 220.000 | € 242.000 | €266.200 | €292.820 | €322.102 |

| Year | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
|---|---|---|---|---|---|---|
| Funds for providing spaces and equipment for online learning, study and communication. | €250.000 | €275.000 | €302.500 | €332.750 | €366.025 | €402.627 |
| Funds for subscriptions to computer hardware/software | €50.000 | €55.000 | €60.500 | €66.550 | €73.205 | €80.525 |
| Equipping research centres with high-performance equipment | €400.000 | €440.000 | €484.000 | €532.400 | €585.640 | €644.204 |
| Staff training in research centres. | €25.000 | €27.500 | €30.250 | €33.275 | €36.602 | €40.262 |
| Increasing applied research and innovations. | €50.000 | €55.000 | €60.500 | €66.550 | €73.205 | €80.525 |
| Stimulation and support of partnerships with scientific institutions in the region and Europe. | €15.000 | €16.500 | €18.150 | €19.965 | €21.961 | €24.157 |
| E-Infrastructure (centres for data storage and management and training for enhancing human capacities. | €500.000 | €550.000 | €605.000 | €665.500 | €732.050 | €805.255 |
| Funds supporting bilateral agreements to strengthen SR&I activities | €100.000 | €110.000 | €121.000 | €133.100 | €146.410 | €161.051 |
| Funds for academic diaspora mobility | €300.000 | €330.000 | €363.000 | €393.300 | €439.230 | €483.153 |
| Funds for scientific projects in partnership with the academic diaspora | €150.000 | €165.000 | €181.500 | €199.650 | €219.615 | €241.576 |
| Planning the scheme for the engagement of the academic diaspora in scientific research activities | €200.000 | €220.000 | €242.000 | €262.200 | €292.820 | €322.102 |
| International mobility for doctoral students enrolled with HEIs of Kosovo, students of doctoral programs to increase the quality of the program, training and co-authorship in papers in high-ranked journals according to specific fields | €216.000 | €237.600 | €261.360 | €287.496 | €316.245 | €347.870 |
| International mobilities for researchers and scientific workers engaged in universities, institutes and other scientific research institutions - with the aim of publishing in top-ranked journals according to specific fields or/and preparing applications for Horizon grants and other international R&I grants. | €216.000 | €237.600 | €261.360 | €287.496 | €316.245 | €347.870 |
| The fund to support 6-month small scientific projects for young researchers. | € 100.000 | €110.000 | € 121.000 | € 133.100 | € 146.410 | € 161.051 |

| Year | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
|---|---|---|---|---|---|---|
| Performance scheme for researchers to increase up to 10% on an annual basis. | € 100.000 | €110.000 | € 121.000 | € 133.100 | € 146.410 | € 161.051 |
| Support of researchers for applications to international mobility funds (Erasmus+, Horizon Europe, etc.). | €45.000 | € 49.500 | € 54.450 | € 59.895 | € 65.884 | € 72.472 |
| Support for participation in international scientific research networks (European RTD Framework Program and COST) | € 350.000 | € 385.000 | € 423.500 | € 465.850 | € 512.435 | € 563.678 |
| Establishment of the Center for training and preparation of scientific and innovative project proposals. | € 500.000 | € 500,000 | € 1.000,000 | 0 | 0 | 0 |
| Publication Support Program for Kosovar scientists for publication in local journals. | € 50.000 | € 55.000 | € 60.500 | € 66.550 | € 73.250 | € 80.525 |
| Support of joint international doctoral programs with leading international institutions ("double degree", "joint degree"). | € 250.000 | € 275.000 | € 302.500 | € 332.750 | € 366.025 | € 402.627 |
| Support of professional doctorates in accordance with the law and the needs of the country. | €50.000 | €55.000 | €60.500 | €66.550 | €73.205 | €80.525 |
| Funds for start-up and spin-off and SMEs. | €500.000 | €500.000 | €1.000.000 | 0 | 0 | 0 |
| Funds for innovative scientific research projects. | €1.000.000 | €1.100.000 | €1.210.000 | 0 | 0 | 0 |
| Funding for successful applicants to Horizon EU projects with industry | €30.000 | €33.000 | €36.300 | €39.930 | €43.923 | €48.315 |
| Establishment of research centres for transfer of knowledge and technology | €500.000 | €500.000 | €500.000 | 0 | 0 | 0 |
| Financial incentive package for patent commercialization | €25.000 | €27.500 | €30.250 | €33.275 | €36.602 | €40.262 |
| Establishment of the State Interdisciplinary Institute for Science and Technology and laboratories with advanced equipment harmonized with Objective 6 and priority areas. | 0 | €3.000.000 | €5.000.000 | €7.000.000 | 0 | 0 |

| Year | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
|---|---|---|---|---|---|---|
| Providing funds for scientific research to be carried out in institutes. | 0 | 0 | 0 | 0 | €1.250.000 | 0 |
| Setting up interdisciplinary programs & financial support schemes for scientific research and innovation in core disciplines. | €50.000 | €55.000 | €60.500 | €66.550 | €73.205 | €80.525 |
| Enhancing human capacities for scientific research and innovation related to the priority areas of the NSP 2023-2028. | €5.000 | €5.500 | €6.050 | €6.655 | €7.320 | €8.052 |
| Financial support scheme for researchers who demonstrate exceptional and innovative achievements within priority areas (Scientist of the Year and Young Scientist of the Year). | €12.500 | €13.750 | €15.125 | €16.637 | €18.301 | €20.131 |
| Financial support for training/expertise for monitoring mechanisms | €80.000 | €88.000 | €96.800 | €106.480 | €117.128 | €128.840 |

## 9. Key operational challenges

Although the NSP has proposed a possible mechanism for the conducting, strengthening and internationalization of the scientific research activity in Kosovo, in the following are presented some operational risks/challenges that may affect the achievement of the objectives and measures foreseen in the program and some recommendations on how to overcome these challenges.

- Delays in the approval of the National Science Program by the Assembly of the Republic of Kosovo, and failure to assume the implementation of opportunities of this program on the part of line ministries and implementing institutions in the country.
- The low rate of implementation of the previous National Science Program comes primarily from the lack of adequate programmatic monitoring and evaluation at the country level and in institutions implementing scientific research activities that have little or no capacity for risk/challenges assessment affecting scientific research activity. Timely forecasting of possible internal or external risks, as well as the planning of adaptation mechanisms against the presented challenges, can completely avoid or mitigate the effects of the risk of non-implementation of planned activities within the NSP.
- The amendment and supplement of the Law on Scientific Research Activity and the Law on Higher Education should also enable the preparation of legal amendments for the implementation of various programs and instruments provided for by the National Science Program. In this regard, symmetrical synchronization of these two system laws and the accompanying legal framework relevant to the scientific research activity is recommended.
- In general, at the country level, there is a partial or complete lack of evidence of implementation, use of scientific infrastructure, coordination of human research resources and expenditures dedicated to scientific research. In addition, as soon as the NSP is approved by the Assembly of the Republic of Kosovo, all stakeholders should be widely informed, so that detailed planning and programming of the strategic objectives and measures (instruments) defined in the National Science Program can be done. for them to be applicable and with higher effectiveness. For this purpose, stakeholders should prepare clear, accurate and transparent reporting rules that will be included in a unique database used by all.

- A decisive step for the success or failure of the implementation of the National Science Program is the readiness of MESTI regarding its launch and operational implementation, the establishment of an agency for science or the establishment of a body that will enable the implementation of transparent schemes of monitoring and evaluation. At the moment, the operational capacities in MESTI are not built or in some parts not fully professionalized and trained according to European standards in this regard. It is strongly recommended to build and raise the ministerial capacities to be able to carry out implementation.
- Limited capacities for local scientific research, increased competition for benefiting from, and participating in, international funds dedicated to scientific research, as well as the possibility of re-destination of these funds, will make it difficult to benefit from international funds that would affect the enhancement of scientific research activity in the country. It is recommended to motivate and build local and international strategic partnerships for the promotion and advancement of science and its impact on Kosovar society.
- Ensure quality monitoring and evaluation process through the key instruments and indicators defined in the National Science Program. Therefore, the process and requirements for monitoring and evaluation must be accurately and transparently stipulated during the design of the accompanying legal infrastructure implementing this process. This process must be built and developed in accordance with European best practices, as well as the inclusion of international expertise.
- Although the budget requirements across the next 6 years look challenging at first sight, there is a legal requirement to earmark up to 0.7% of the national budget for scientific research activities. However, a rapid increase in budget allocations and expenditures is to be expected as explained in the previous section. MESTI has the authority and responsibility to plan ahead and guarantee a smooth implementation without stillstand and breaks, by ensuring some flexibility in budget requests to tackle new upcoming issues, which are not yet at stake at the time being.
- There is a risk that participatory stakeholder approaches may reflect existing inequalities. The most powerful stakeholders with a specific role in the implementation of the NSP, in the absence of a clear legal obligation, can either dominate/deflect the participatory approach or not participate at all. Another aspect of this asymmetry between the stakeholders implementing the NSP is the subjective approach of the holders of managerial positions to the advancement of scientific research activity. Ways to include these people in a "holistic" scientific research approach are often difficult, especially when there are legal, social or cultural barriers. To avoid these possible risk approaches and concepts, it is recommended to have a wider representation of stakeholders and the involvement of those who benefit directly, but also indirectly during the development and implementation of the scientific research strategy of the relevant institutions, depending on their intended role under the NSP.

# 10. Annex 1: List of experts participating in the drafting of the NSP

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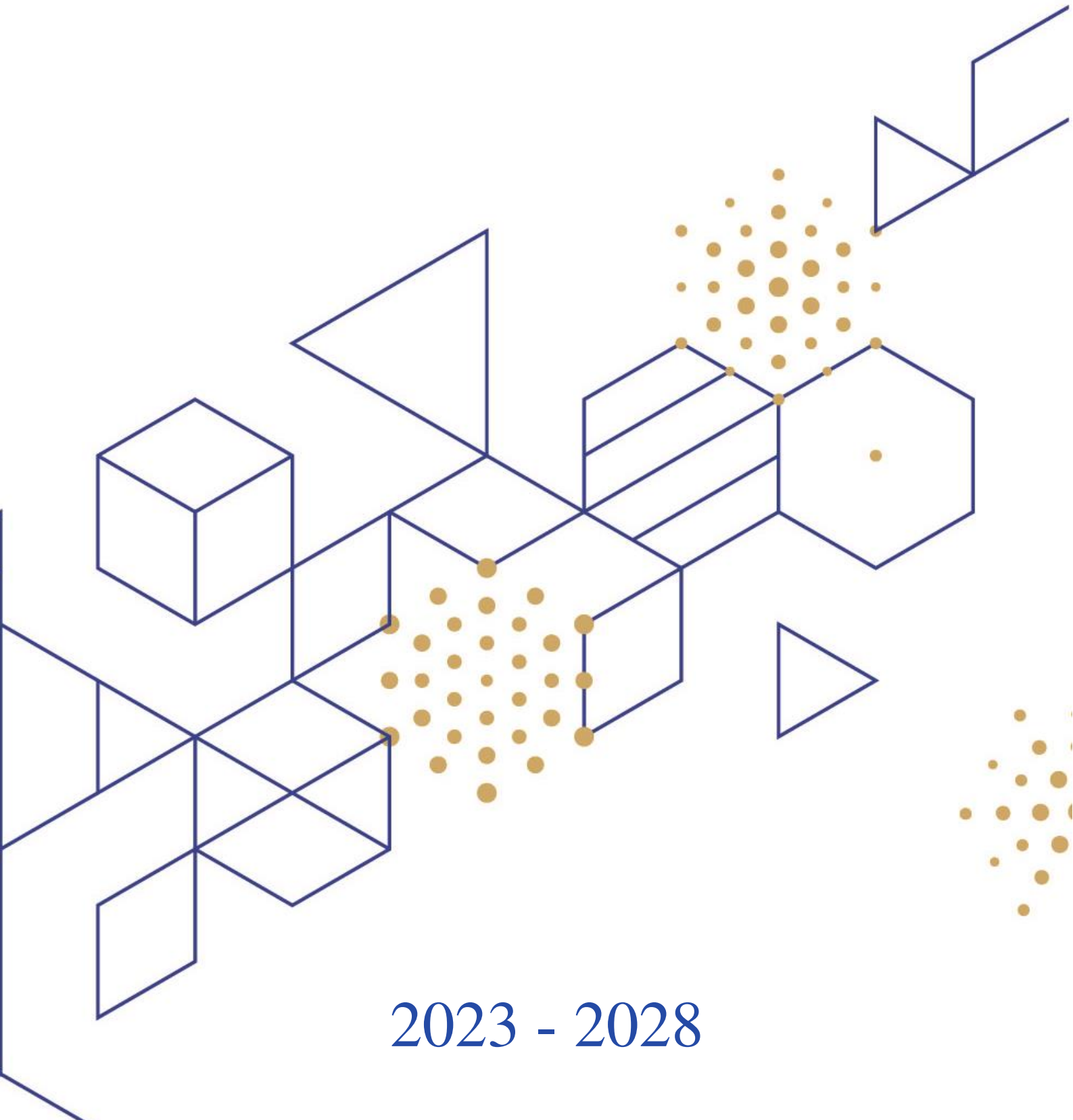

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