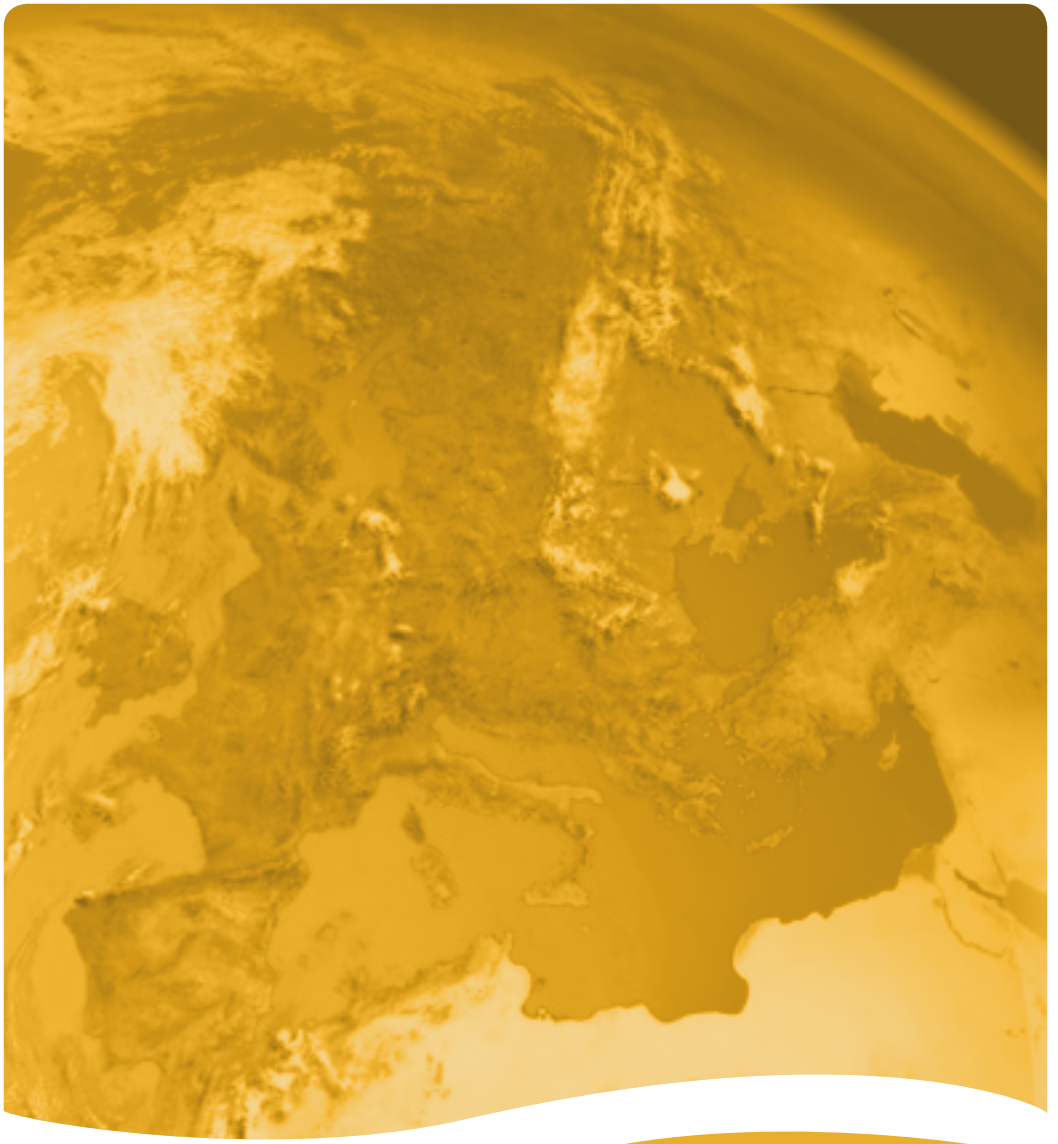

I. ANNEX – Country Reports

I.1 Country Report Armenia

Current State of S&T & Major Policy Challenges

S&T Indicators

TABLE 5: S&T LANDSCAPE 2010[70]

R&D Expenditure as % of GDP	Number of research organisations	Number of researchers
0.27	83	6,926

Research Structure and Policy

Nowadays a pressing challenge for Armenia is the reformation of its S&T and innovation system in accordance with the requirements of the market economy and needs of economic development. During the last decade several legal acts have been adopted in Armenia directed to the regulation and creation of favourable conditions for R&D and innovation activities.

In December 2000, the Armenian Parliament adopted the Law on Scientific and Technological Activity aiming at regulating interrelations between R&D performers, state bodies, and R&D outcome consumers, as well as outlining general principles of formation and implementation of state policy in the field of S&T. The Law prescribed the Ministry of Education and Science (MES) as a state authorised body to develop and coordinate S&T policy-making.

By government resolution as of September 2006, the Ministry of Trade and Economic Development was recognised as authorised as the body being responsible for development and implementation of innovation policy, in cooperation and coordination with other concerned ministries and organisations.

To improve the policy-making and better the coordination in the field of S&T, in October 2007 the government made a decision on creation of the State Committee of Science empowered to carry out integrated S&T policy in the country. This structure is subordinated to the Ministry of Education and Science, but with wider power of independent activity. The Committee is also responsible for the development and implementation of research programmes in the country through three main financing mechanisms: thematic (project based) financing, basic financing and special purpose projects[71].

The law on the National Academy of Sciences of Armenia (NAS RA) was adopted by the Parliament on 14 April 2011, which assigned a status of highest self-governing state organisation with special status to the Academy empowered to coordinate and carry out basic and applied research directed to the creation of a knowledge-based economy, and social and cultural development of the country. This Law gave more power to the Academy and its research institutes in carrying out business activities towards the commercialisation of R&D outcomes and the creation of spin-offs.

In May 2010, the Government adopted the Strategy on Development of Science in Armenia, which outlined the state policy towards development of science in 2011-2020. Based on this strategy, the Action Plan 2011-2015 was approved by the government in 2011 on the development of science in Armenia which incorporates the following targets for the stated period as follows:

- Improving the S&T management system and ensuring adequate conditions for the sustainable development;
- Measures on increasing the number of young and talented specialist involved in research, education and technological development, upgrading of research infrastructure;
- Creating adequate conditions for the development of integrated science, technology and innovation systems
- Developing international cooperation in RTD.

One of the main positive aspects in the latest adopted policy documents is the existence of quantitative targets to measure the success of implementation of envisaged measures. During this period, several other governmental acts and decisions have also been adopted directed to the regulation of S&T and the innovation policy in the country.

In May 2001, the government approved the concept on the development of an information technology industry in Armenia. It emphasises the existence of an adequate potential in the country for the development of an IT sector, and the need for a further improvement of the infrastructure and legislation supporting development of the IT industry.

In May 2010, the government issued a new resolution on Science and Technology Development Priorities for 2010-1014 in the Republic of Armenia. These priorities are stated to be as follows:

- Armenian Studies, Humanities and Social Sciences;
- Life Sciences
- Renewable Energy, New Energy Sources
- Advanced Technologies, Information Technologies
- Space, Earth Sciences, Sustainable Use of Natural Resources
- Basic research promoting applied research of vital importance[72]

In 2009, total budget allocations to R&D amounted to around 8.4 billion AMD (around €18 million).

Important Research Organisations

The National Academy of Sciences of Armenia (NAS RA) with around 35 affiliated research institutes and centres remains to be the main R&D performing organisation in Armenia. The Academy promotes and carries out fundamental and applied research in different scientific fields, as well as coordinates basic research carried out throughout Armenia.

The new Statute of the National Academy of Sciences of Armenia was approved by the government in May 2011, based on the Law on the National Academy of Sciences of Armenia, allowing the Academy to carry out wider business activities towards the commercialisation of R&D outcomes and the creation of spin-offs. The Executive Comittee of NAS RA has five scientific divisions on particular areas of science:

- Division of Mathematical and Technical Sciences[73],
- Division of Physics and Astrophysics,
- Division of Natural Sciences,
- Division of Chemistry and Earth Sciences,
- Division of Armenology and Social Sciences[74].

In November 2006, the Armenian government adopted a resolution to optimise the Academy infrastructure and to restructure some of its institutes through amalgamation and creation of scientific and technology centres. This decision was aimed at improving coordination of research activity in the institutes involved in overlapping or closely related research disciplines, more efficient use of scarce financial resources and promoting commercialisation of research outcomes. For example, the Scientific and Technological Centre of Organic and Pharmaceutical Chemistry was created through the amalgamation of the Institute of Fine Organic Chemistry, Institute of Organic Chemistry and Molecular Structure Research Centre.

The higher education system in Armenia consists of 22 public institutions of higher education (IHEs) and over 70 private IHEs. From 2000 on, the system of higher education in the country started to reform itself along the lines of the European models as per the Bologna agreement. Unfortunately, there are no statistical data on the dynamics of R&D intensity in the university sector to analyse trends during recent years. However, based on general observations and personal interviews, it can be stated that university R&D, particularly in leading state universities, is increasing. The universities are more flexible in redirecting revenues

[70] National Statistical Service of RA, www.armstat.am (2009 data)
[71] State Committee of Science, www.scs.am
[72] State Committee of Science, www.scs.am
[73] www.sci.am/resorgs.php?langid=1#1
[74] www.sci.am

from tuition fees to the modernisation of research laboratories and funding research activities.

The leading universities of Armenia are Yerevan State University, State Engineering University of Armenia, State Medical University, State Agrarian University, Russian-Armenian State University, French University, and American University of Armenia (AUA). AUA was founded in 1991 and, parallel to its academic programmes, the Centre for Business Research and Development, the Engineering Research Centre, the Centre for Policy Analysis, the Centre for Environmental Management and Research, the Centre for Health Services Research, and the Legal Resource Centre exist in AUA to promote research in conjunction with graduate teaching. AUA faculty members are invited to promote learning and knowledge by teaching and conducting research.

Dramatic downsizing of R&D intensity, starting from the early1990s after the collapse of the former Soviet Union, mostly affected branch and enterprise research institutes, which were involved in applied research and subordinated to local or Moscow-based industries or ministries. The vast majority of these enterprises have been privatised during the last decades, and stopped or reoriented their activities by shutting down RTD divisions.

Among the still operating leading branch research institutes are the Yerevan Physics Institute (YPI) - one of the leading research centres involved in high-energy physics research, the Yerevan Computer Research and Development Institute, and the Yerevan Automated Control Systems Research Institute.

There are also a number of small enterprises involved in innovative R&D activities. Such enterprises could play an essential role in economic development of the country, but they face a number of problems, such as:

a. shortage of qualified specialists in the field of technology transfer, commercialisation, and management, and lack of innovation support for intermediary organisations;
b. low awareness in intellectual property related issues among businessmen involved in technological development;
c. lack of financial institutes and venture capital funds providing loans on acceptable conditions.

Current Trends & Challenges in International Cooperation

National Policies

All the policy and strategy documents adopted during the last decades directed to the regulation and the development of S&T and Innovation in Armenia stress the importance of the development of international cooperation in the field of sciences and technology, and better positioning of the country in the international research and development environment.

In particular, the Law on Scientific and Technological Activity, the Strategy on Development of Science and Action Plan 2011-2015 on the development of science in Armenia include the development of international cooperation in RTD as one of the main challenges.

Bilateral Agreements

On the intergovernmental level, during 1991-2005 S&T and/or cultural cooperation agreements were signed with around 20 EECA and EU-member states, including France, Greece, Romania, Slovakia, Bulgaria, Cyprus, Portugal, Poland, UK, Russia, Ukraine, Belarus, Georgia, Kyrgyzstan, Tajikistan and Turkmenistan. During this period S&T and/or cultural cooperation agreements were also signed with Argentina, China, India, Iran, and the USA.

The State Committee of Science of Armenia and CNRS (France) signed a bilateral cooperation agreement in January 2009. The agreement provides framework for exchanging scientists of the two countries, implementation of joint scientific and research programmes, organisation of joints scientific conferences and seminars. The joint programme is implemented with the contributions of the two sides. In the framework of this cooperation, in November 2010 a trilateral agreement on the establishment of joint laboratories was signed between CNRS, the National Academy of Sciences and the State Committee of Sciences. Up to now, three laboratories were established in the fields of geological sciences, archaeology and physical research.

NAS RA has cooperation agreements with the Academies of Sciences of the Russian Federation, Belarus, Ukraine, Turkmenistan, Georgia, Hungary, China and a Memorandum of Understanding with the Indian National Science Academy.

Being among leading universities of Armenia, the Yerevan State University, the State Engineering University of Armenia, the Yerevan State Medical University and the State Agrarian University maintain wide international cooperation within cooperation agreements in the field of education and research with various universities and research centres of more than 30 countries of the world, including Russia, Great Britain, France, Italy, Germany, Greece, Spain, Sweden, Japan, China, Poland, USA, and others.

Regional Network/Cooperation

In 1992 the National Academy of Sciences of Republic of Armenia (NAS RA) joined the International Council for Science (ICSU). NAS RA is also a member of the InterAcademy Panel on International Issues, the International Association of Academies of Sciences, and the Council of Academies of Sciences of BSEC Countries.

According to the ISI database, Armenian scientists published 4,347 SCI articles and 112 SSCI and AHCI articles in 1997-2007. Armenia has after Russia the second highest number of international publications per a million inhabitants, reaching 136 articles in 2007. The country also has the highest average number of publications related to its GDP – 24 in 2007. The latter figure is probably due to the important role of Armenian Diaspora.

The main research area of the published articles is outstandingly p-Physics and astronomy (39.4%) followed by chemistry (9.81%) and mathematics (7.91%)[75]. Yerevan Physics Institute with 1,689 articles in ISI Web publications clearly leads the list of Armenian institutions' publications while on the name of the whole NAS RA is 1,192 publications. The gap with the next in the list - Byurakan Astrophysical Observatory which has published 193 articles – is already outstanding. Among those with more than 100 publications in ISI database are still the State Engineering University of Armenia (108) and the Yerevan State University (108). Armenian scientists' international articles are most often written in co-authorship with French, German, Italian, Russian, and US researchers. In general, the number of countries from which the co-authors for Armenian scientists' publications come is not very high, being 37 from 1997-2007[76].

In 2010, Armenia's National Academy of Sciences in cooperation with the French Centre National de la Recherché Scientifique (CNRS) established three joint laboratories in Armenia. One of the laboratories was established in conjunction with the Institute for Physical Research, the second with the Institute of Geology, and the third with the Institute of Ethnography and Archaeology.

The annual funding of these laboratories is split equally between the two parties. The Armenian side is the State Committee of Science.

Since 2004 Joint Research Expedition on hydro-ecological investigation of Lake Seven has been launched jointly with the National Academy of Sciences of the Russian Federation.

The Joint Scientific Experimental Centre (JSEC) operates at the Institute of Zoology of NAS RA opened jointly with the Centre of Zoology and Hydroecology of NAS RA and the Centre of Parasitology within the A.N. Severtsov Institute of Problem of Ecology and Evolution of the Russian Academy of Sciences.

In June 2011, the first ***Regional Mobile Application Laboratory (mLab)*** for Eastern Europe, South Caucasus, and Central Asia (ECA region) was launched by the Enterprise Incubator Foundation in Armenia. Through a competitive tendering process, EIF was selected from a pool of more than 15 candidates as a host for the mLab, where local and regional companies, technologists and experts can collaborate to develop locally relevant applications that meet user demands.

The ***mLab ECA*** is funded by infoDev, a donor-funded programme in the World Bank's Financial and Private Sector Development Vice Presidency, as part of the Government of Finland and the Nokia joint programme on Creating Sustainable Businesses in the Knowledge Economy.

The mLab will be the focal point to increase the competitiveness of innovative enterprises working on mobile content and applications of the region. It will serve as a platform for the development of technical and business skills, personal contacts and relationships needed to build scalable mobile solutions into flourishing businesses.

The mLab will provide a wide range of innovation support services, including organisation of trainings, business mentoring, idea generation and matching grants. Its management and expert team will work with mobile application developers in the region to assist them in product development and promotion,

[75] SCImago database, published articles in peer-reviewed journals in 2007.
[76] ISI WoK, 2008

connecting them with potential investors, academic experts, and public sector leaders. A new mobile application testing environment will be set up as well. The mLab ECA is planned to start its operation in mid 2011[77].

European Neighbourhood Policy

New prospects for a closer EU-Armenia cooperation were opened after the inclusion of Armenia into the European New Neighbourhood Policy (ENP) Initiative and the further development of the ENP Action Plan aiming at contributing to the sustainable economic development of the country. The ENP Action Plan includes the article on measures in the field of S&T incorporating points towards assisting in the development of adequate S&T and Innovation policy system reformation activities and the creation of independent peer-review structure for competitive selection of RTD projects in Armenia. It also contains an article stating the need for a closer integration of Armenia into European Research Area through more active promotion of participation of Armenian research organisations in EU's Framework Programmes. European Commission assistance to Armenia mainly takes the form of Annual ***Action Programmes*** under the ***European Neighbourhood and Partnership Instrument*** (ENPI). Other funding sources are the ***Instrument for Nuclear Safety Cooperation*** (INSC) or the ***thematic assistance programmes***, concentrating for example on human rights or civil society.

The EU wants to support the development of an increasingly close relationship with Armenia in the context of the ***European Neighbourhood Policy*** (ENP) and based on the objectives defined in the Partnership and ***Cooperation Agreement*** (PCA) and the EU-Armenia ENP ***Action Plan***.

The European Commission's assistance focuses in particular on strengthening democratic structures and good governance, on support for regulatory reform and administrative capacity building and on poverty reduction.

The ***Armenian-European Policy and Legal Advice Centre*** (AEPLAC) was set up with EU funding in order to support the country's economic, political and social development. Work here embraces the principles set out in the ***Partnership and Cooperation Agreement*** (PCA) and ***ENP Action Plan*** which outline relations between the EU and Armenia.

The EU contributes to the ***protection of the environment in the Kura river basin***.

An EU project has established a Chair for European and International Law, as well as a ***Centre for European Studies***, European and International Law at Armenia's Yerevan State University. The project intends to secure the services of qualified professionals in the field of European legislation, as well as experts in European business, economics and political science. In 2008, the European Commission continued to support the national reform efforts in Armenia and programmed assistance for a total amount of €24 million under the European Neighbourhood Partnership Instrument (ENPI). The 2008 Annual Action programme included a sector budget support operation on Support to Justice Reforms.

This support was part of an indicative amount of €98.4 million, which has been allocated for the period 2007-10 under the ENPI.

With regard to nuclear energy, the EC continued to assist in ensuring minimum safety standards for the Medzamor Nuclear Power Plant (2006 budget). Further support, amounting to €7.2 million, is provided within the Action Plan 2007 under the Instrument for Nuclear Safety Cooperation[78].

Partnership and Cooperation Agreements (PCAs)

A Partnership and Cooperation Agreement between the EU and Armenia was signed in April 1996 and entered into force at the beginning of July 1999. It serves as legal basis for the development of cooperation including in the field of S&T.

Article 51 on Cooperation in science and technology of the Agreement states that the Parties shall promote cooperation in civil scientific research and technological development (RTD) on the basis of mutual benefit and, taking into account the availability of resources, adequate access to their respective programmes and subject to appropriate levels of effective protection of intellectual, industrial and commercial property rights (IPR).

National and bilateral programmes

- Fostering scientific cooperation within the framework of joint research projects in all fields of exact, natural, social, and human sciences between CNRS (France) and SCS (the State Committee of Science of the Republic of Armenia); Start date: January 2009; End date: open
- Call for joint bi-lateral basic research projects 2011 between BRFFR (BY) and the State Committee of Science (AM); Start date: February 2011; End date: open
- Pilot Joint Call (PJC) of interested programme owners in the Member States of the European Union (MS), the Associated Countries to the 7th Framework Programme (AC), and the extended Black Sea region within FP7. The Black Sea ERA.NET project is to promote collaborative research on Environment and Energy. Participating countries were Armenia, Azerbaijan, Bulgaria, France, Georgia, Germany, Greece, Italy, Moldova, Romania, Turkey, and Ukraine. The implementation of this Pilot Joint Call is an early step towards meeting the overall aim of the Black Sea ERA.NET project, namely the development of a Black Sea Research Programme (BSRP). Start date: September 2010; End date: January 2011.

None of the existing National Research Programmes in Armenia is open for foreign researchers.

EU Framework Programme for Research and Technological Development

Taking into consideration the importance of creating a European Research Area and Armenian integration into it, with the aim to encourage an adequate participation of Armenian researchers in the Community R&D Programmes, at the beginning of 2004, on the joint initiative of the European Commission and INTAS, National Information Point (NIP) for the European Union Framework Programme for Research and Technological Development was established in Armenia. The main objective of the NIP was promoting a more active participation of Armenian academic institutes, universities and branch (ministerial) research institutions and SMEs in European research programmes through a wider dissemination of information about the European Research Area and Framework Programmes and providing consultancy to the Armenian research community.

One of the NIP's long-term objectives was to set up NCPs of FP thematic priorities which would become a part of the European well established NCP Network. In early 2007, three years after the fruitful activity of NIP, 5 NCP headed by National Coordinator NCP were established, namely, SME NCP, ICT NCP, SiS NCP, INCO NCP and Legal & Financial NCP. In March 2009, two more NCPs were officially nominated by the RA Ministry of Education and Science: People NCP and Health NCP. The NCP system is hosted by the National Academy of Sciences of Armenia.

One of the main problems of the NCP system in Armenia is the absence of a dedicated financial support from local authorities for NCP activities. The National Academy of Sciences submitted a proposal to the State Committee of Science asking to allocate special funding for activities of the NCP system but the issue is still pending. Another possible solution might be the allocation of some funding for NCP system within ENPI or Eastern Partnership Initiatives. For instance, following the EC decision, during 2010 Eastern Partnership country NCP Coordinators and Legal and Financial NCPs were supported to attend NCP meetings and information days in Brussels.

As of October 2010, Armenian research teams have submitted around 106 project proposals for FP7, of which 22 were successful with the following FP7 thematic distribution: Health -1, ICT-3, Environment-1, ResInfra-5, People-5, INCO-7. All in all, Armenian research teams have received around €1,000,000 EC contribution. According to preliminary results of the FP7 –INCO-2011-6 ERA WIDE Call for Proposals on reinforcing cooperation with Europe's neighbours in the context of ERA, three projects with Armenian participation have been invited for negotiation in 2011. The involved Armenian institutes are the Centre for Ecological & Noosphere Studies of NAS RA, the Institute for Informatics and Automation Problems of NAS RA, and the Institute for Physical Research of NAS RA. The total budget of the three projects is around 1.5 m Euros.

European Neighbourhood Policy Instrument (ENPI)

European Commission assistance to Armenia mainly takes the form of Annual ***Action Programmes*** under the ***European Neighbourhood and Partnership Instrument*** (ENPI). Other funding sources are the ***Instrument for Nuclear Safety Cooperation*** (INSC) or the ***thematic assistance programmes***, concentrating, for example, on human rights or civil society.

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[77] Enterprise Incubator Foundation, www.eif.am
[78] www.ec.europa.eu/europeaid/where/neighbourhood/country-cooperation/armenia/armenia_en.htm

development. Work here embraces the principles set out in the ***Partnership and Cooperation Agreement*** (PCA) and the ***ENP Action Plan*** which outline relations between the EU and Armenia.

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Lifelong Learning Programme (LLP)

Up to now there is no participation of Armenia in Comenius, Erasmus, Leonardo da Vinci and Grundtvig programmes.

The Tempus programme has been opened in Armenia since 1995. For this period 45 projects with participation of Armenian teams and 60 individual projects were funded by TEMPUS in Armenia. 34 applications with Armenian participants were submitted, of which 4 were successful. For the 2010 call there were 45 applications. The selection procedure is not yet finalised but it is expected that 3-5 projects with Armenian participation will be funded.
Best Practice example: New Master Programme in Applied Biosciences (MAPB) has been designed at the Faculty of Biology of Yerevan State University and the Armenian State Agrarian University within the framework of the TEMPUS Programme in partnership with other regional and European Universities, such as the Tbilisi State University, the Akaki Tsereteli State University, the Georgian State Agrarian University, the University of Alicante (Spain), the University of West of England, the Aristotle University of Thessaloniki and the P&B Consulting Company (Portugal). The programme offers specialisation courses designed to prepare highly qualified professionals in applied biosciences and biotechnology as well as narrow-profile specialists in the spheres of their interest (Healthcare, Environmental, Food and Agro-biotechnology). Each student can choose to follow one of four alternative strands: Healthcare, Environmental, Food and Agro-biotechnology. The curriculum is designed for a degree completion in two years and includes a research internship either in an academic laboratory, partner universities, or in industry.[80]

Erasmus Mundus: In the framework of Erasmus Mundus Action 2 "Partnership for Armenia, Georgia and Azerbaijan" which aims at fostering structured cooperation between European and third country higher education institutions through the promotion of mobility at all level of studies for students (undergraduates and masters), doctoral candidates, researchers, academic and administrative staff, the number of individual mobility activities foreseen for the academic year 2010/11 with participation of Armenian students is 39 with the following distribution by levels of study: Undergraduates 14, Masters 9, Doctorates 9, Post-doctorates 2, Staff 5.

Challenges

The Armenian government has adopted conceptual and legal documents in the sphere of S&T and innovation that include an array of measures and tasks to be implemented by 2015 concerning the reformation of S&T and the innovation management system in Armenia. These include defining priority areas in the R&D and innovation sphere; measures on preventing brain drain and motivation of young specialists to take up a research career, creating and improving legal, taxation, credit, and customs policies; updating the research and technological basis of research institutes and science-intensive branches of economy; promoting academy-university-industry partnership and promoting private business involvement and investment in R&D and innovation programmes, development of international cooperation in RTD and a better positioning of Armenia in the European and International Research Area, adoption of a strategy on the development of science, and, based on this strategy, an Action Plan 2011-2015.

Based on challenges stated in the mentioned documents and trends in the R&D input and innovation driver statistical indicators, we can formulate the main challenges as follows:

R&D intensity (GERD/GDP ratio) has decreased dramatically in Armenia since the collapse of the former Soviet Union, dropping from 2.5% in 1990 to 0.27% in 2009, which is unprecedented among other CIS countries. This level has remained nearly unchanged from the start of the mid-1990s. This decline is reflected also in the number of researchers and research institutes, which have decreased nearly fourfold and twofold, respectively.

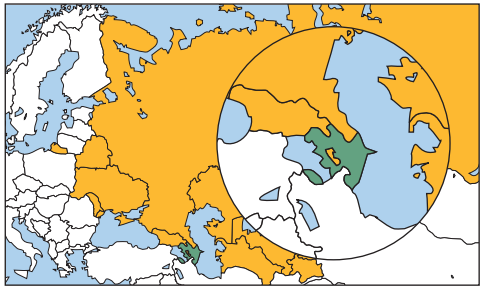
Official documents adopted by the Armenian government regarding R&D and innovation do not set concrete quantitative targets for increasing R&D expenditure. The Law on Scientific and Technological Activity of 2000 initially contained an article obliging the government to increase R&D financing up to 3% of the budget expenditure, but later this article was removed from the Law.

An integral part of this challenge is the consistent increase of participation of the business sector in the whole chain of knowledge creation and application. Currently, no reliable statistical data are available on business expenditure on R&D in Armenia. A presentation of the President of the National Academy of Sciences of Armenia in 2006 mentioned a business expenditure on R&D of around 10%, though this figure reflects non-budget expenditure on R&D, including contract works and international sources. Thus, it can be estimated that the real business expenditure rate is lower and probably insignificant. Other challenges of the Armenian S&T and innovation system can be formulated as follows:

- Absence of a systemic approach to S&T and innovation policy-making based on objective analysis of the current situation and general economic development priorities of the country;
- Envisaged actions to address this challenge: Creation of the State Committee of Science (SCS RA) empowered to carry out integrated S&T policy in the country, adoption of the Strategy and Action Plan 2011-2015 on Development of Science in Armenia, law on the National Academy of Sciences of Armenia and adoption of Science and Technology Development Priorities for 2010-1014. SCS RA expressed its strong interest to involve Armenia in benchmarking of S&T policies in EECA to be carried out within the IncoNet EECA Project.
- Budget allocations to the RTD sector remain extremely low (less than 0.3% of GDP);
- Lack of incentives for private/business sector to invest in RTD and commercialise innovative results;
- Envisaged actions to address this challenge: A new programme for research projects was launched by the SCS RA in 2011 with the requirement for a partnership with an industrial enterprise and up to 15% project co-funding by this industry partner.
- Dispersed research infrastructure and the existence of many overlapping research institutes and teams, which have experience in problems with obsolete infrastructure and facilities, and ageing staff/brain drain;
- Envisaged actions to address this challenge:
  - **a)** Government resolution to optimise the Academy infrastructure and to restructure some of its institutes through amalgamation and creation of scientific and technology centres;
  - **b)** new infrastructure grant programme is launched by the SCS;
  - **c)** new programme is launched for young researchers not older than 35 years;
  - **d)** project-based funding scheme requires involvement of young researchers in the project teams;
  - **e)** a programme offering stipends for 100 talented young researchers is launched
- Lack of statistical data to adequately evaluate S&T and innovation performance, and make internationally comparable analysis

[79] www.ec.europa.eu/europeaid/where/neighbourhood/country-cooperation/armenia/armenia_en.htm
[80] National Tempus Office in Armenia, www.tempus.am/index.php?option=com_content&view=article&id=1337:new-master-program-in-applied-biosciences-mapb&catid=107:tempus

I.2 Country Report Azerbaijan



Current State of S&T & Major Policy Challenges

It should be emphasised that Azerbaijan's economic structure is distinctly different from that of most European countries – there is an almost complete lack of high-tech, consumer goods industries. Therefore, Azerbaijan's national innovation system also has a quite distinctive outlook.

The government's high-level policy body which could establish priorities and create a legislative framework for the implementation of the National RD&I Strategy in accordance with the objectives and sectional strategies of the Government Programme and in consultation with local and central public administration bodies, the ANAS, higher education organisations, RTD institutes, economic agents, employers' federations and labour unions, etc. does not exist in Azerbaijan.

Innovation activity takes place and scientific research is performed by a few private companies, primarily small innovative firms. Such ventures have the potential to be important drivers for the economic development, but face several significant hurdles, including: (1) a shortage of qualified specialists trained in technology transfer, marketing, and management; (2) a general lack of understanding of intellectual property issues and laws among technology entrepreneurs in Azerbaijan; and (3) a lack of available credit on reasonable terms. Together, these factors make a successful commercialisation of the research products very difficult.

Some Azeri companies have entered into partnerships with foreign companies in various ways (such as joint ventures, research contracts, and cooperative research projects) in order to get access to the latest technology as well as to gain managerial and marketing experience. At the same time Azeri research organisations have been very passive in mobilising foreign support and research contracts.

So, generally Azerbaijan does not currently have a formal national R&D and innovation strategy plan or a formal national innovation policy framework. "Innovation policy" has not been formally debated at all by the Azeri government. There have been some government sponsored gatherings to encourage innovation activity but they are carried out sporadically.

Today, the national innovation system of Azerbaijan is at an early stage of its development. It is necessary to have a variety of the intermediary organisations which should promote the further development of innovative systems in the country. There are some more unresolved problems in the field of innovation systems to be addressed in Azerbaijan:

1. the absence of an understanding of an essence and the meaning of an innovation system among politicians;
2. necessity to develop a system of venture investment (off-budget financing of projects with high risk) in the scientific and technical sphere; involving objects of the intellectual and industrial property in economic circulation and maintenance of reliable protection against unauthorised use;
3. development of a methodological manual on innovations for receiving comparative results at international level.

Currently, there are no think tanks, lobby groups, political bodies, trade associations, or employers associations in the country to champion innovation. Different government organisations should be involved in the innovation process, but they tend to operate in relative isolation without a clear and shared policy vision. The government does not encourage a more active role of lower levels of the government in promoting innovation in local industries, and promoting mutual policy learning and networking between policy-making at regional and national levels. However, in some sense, innovation issues are included in a large number of State Programmes which have been accepted during the last 10 years. These programmes have their own objectives and targets and some of them could be interpreted as objectives of the innovation policy of the government. Unfortunately, in many cases, these objectives are not quantified and specific targets are not set.

The government's attempts to increase the role of innovation – implicitly as opposed to explicitly - are expressed in the following governmental legal documents: National Information and Communication Technologies Strategy for the Development of the Republic of Azerbaijan (2003-2012), State Programme on Development of ICT in Azerbaijan Republic in 2005-2008 (Electronic Azerbaijan), Creation of Regional Innovation Zone in Azerbaijan, State Programme on the Development of Fuel and Energy Complex of the Azerbaijan Republic (2005-2015), State Programme on Using Alternative and Renewable Energy Sources in the Azerbaijan Republic, Establishment of „Azerbaijan Investment Company", Scholarship Programme for the Azerbaijani Youth to Study Abroad, etc. Unfortunately, all documents mentioned afore only contain a qualitative description of the objectives but lack concrete quantitative targets and indications of the appropriate budget allocations.

Policy response ranking scored from 1 to 5:

1. No specific measures addressing the challenge (possibly a debate but no evidence of any real policy development);
2. Policy development under way to respond to challenge (policy debate or design launched, e.g. announced in National Lisbon Reform Plan, etc.);
3. Specific measures existing for some time, but insufficient to respond fully to challenge;
4. Existing measure plus one or more newly launched measures (during the last 18 months);
5. A comprehensive set of measures, which potentially responds fully to the challenge.

Evidence of impact scored from 1 to 5:

1. Trend for indicators has worsened since measure(s) introduced;
2. No observable change in trend since measure(s) introduced;
3. Too early to appraise (measures introduced in the last 24 months);
4. Trend for indicators has improved since measure(s) introduced;
5. Evaluation or study indicates measure(s) has/have clearly contributed to improving performance of the country.

S&T Indicators

TABLE 7: S&T LANDSCAPE 2010

R&D Expenditure as % of GDP	Number of research organisations	Number of researchers
0.2	146	22,500

Research Structure and Policy

It is noteworthy that the Government of Azerbaijan applies all financial control mechanisms: the Ministry of Finance allocates funds for material expenditure, research projects, junior researcher employment and approval of vacancies for new appointments.

In general, governments mainly finance basic research. However, the Azerbaijan government finances applied researches twice as much as usual. So, in 2003, out of current domestic expenditures

TABLE 6: INNOVATION CHALLENGES, POLICY RESPONSES AND IMPACT

Challenge	Relevance of policy response	Evidence of impact
Elaboration of the state RTD and Innovation strategy	3	N/A
Renewal of the knowledge basis, including improvement of research quality and capacity for innovation	3	N/A
Increasing the competitiveness of traditional industries by introduction of new technologies	4	3
Promoting the creation of new high technology firms	4	4

for RTD 25.1% were spent on basic research, 61.6% on applied research, 13.3% on development. Priorities: as the statistics shows in 2003, 37% of the current domestic expenditures on RTD were spent on technical sciences, 31% on natural sciences, 15% on humanities, 6% on agricultural sciences, 8% on social sciences and 4% on medicine.

Researchers in Azerbaijan are allocated in

a. Research Institutes of the Azerbaijan National Academy of Sciences
b. Branch Institutes of different ministries
c. The higher education sector 4. R&D units in the private sector

Important Research Organisations

The highest scientific body of the country is the Azerbaijan National Academy of Sciences (ANAS) that unites all the leading scientific research institutes. The Azerbaijan National Academy of Sciences (ANAS) was appointed by the last Presidential decree as an organisation which carries out RTD policy in the Republic, coordinates and directs the scientific research in all state research and educational centres, and represents Azerbaijan in the area of scientific and technological development in foreign countries.

There are currently 146 RTD organisations, including 93 National RTD Institutes coordinated by the ANAS and by eight ministries: Ministry of Economic Development, Ministry of Health, Ministry of Agriculture, Ministry of Environment and Natural Resources, Ministry of Communications and Information Technology, Ministry of Transports, Ministry of Labour and Social Protection and Ministry of National Defence.

Most RTD organisations are active in technical and engineering sciences, with specialisation profiles corresponding to various branches of processing industries. Other RTD institutions are active in agricultural sciences, natural and exact sciences, medical sciences, social sciences and humanities.

The institutes of ANAS include most of the country's research organisations. The ANAS has 45 organisations which are divided into 6 divisions. According to the ANAS Executive Board, the Academy and its various institutes and centres employed nearly 10,000 people. Activity of the ANAS is mostly financed from the state budget.

The institutes which are in submission of the various ministries (branch institutes) do not concern the state budget, and are financed by those ministries to which they submit. They carry out concrete orders of the branch, industrial enterprises, and also perform works on the basis of foreign grants.

It is necessary to note that the number of the organisations carrying out research and development and the number of the personnel occupied with research and development, but also expenses for research and development, have grown over the past years.

The ruling organisation, which should regulate scientific and technological development and innovation in the country is unspecified. There is no Ministry of Science or Scientific Research in Azerbaijan. On the base of the President's decree issued in the beginning of 2009, the ANAS is considered to be the main organisation which provides and organises the development of science in the Azerbaijan Republic, carries out the scientific and technological policy of the state, connects and leads the scientific research activity in all scientific and educational institutions. Along with this, as it is shown in this decree, the duties of the ANAS are to participate or to give suggestions in determination and qualification of the directions of science's development, in general, the directions of the scientific and technological policy. At the same time it is noted in the regulations of the Ministry of Economic Development of Azerbaijan that the Ministry participates in the formation of the state innovation and the science and technology policy, i.e. at present there is no concrete body which could determine the priorities of the science, technology, and innovation policy in the country.

Higher education organisations: there are 47 higher education institutions in total, including 30 public universities and 17 accredited private universities. The S&T profile of the higher education system shows the highest concentration of students in the technical area followed by the medical and basic sciences.

Scientific research institutes and universities are mostly located in Baku. But there are scientific research institutes and universities in large cities of the republic, such as Sumgait, Ganja, Lankaran, Nakhchivan, etc. Currently, Azerbaijan's research sector employs about 28,000 employees (all ranks), of which 80% are researchers. During the transitional period, this part of the RTD system experienced severe troubles: low level of financial support from the state budget and industry, low salaries for scientists and engineers and de facto stagnation in the RTD activity.

The enterprise sector in Azerbaijan is still under-represented in RTD performance and there are only limited joint RTD initiatives between the public and the private sectors. Unfortunately, so far international RTD collaboration with Western countries is also limited. This raises needs at the level of intermediary organisations and there is still need to develop and implement mechanisms supporting public-private research cooperations which aim at increasing the capabilities of both knowledge producers and knowledge users. Public initiatives have to be integrated in science policy to encourage public-private partnerships.

Current Trends & Challenges in International Cooperation

Bilateral Agreements

The State Agency on Standardisation, Metrology and Patents (SASMP) of Azerbaijan has up to now joined 8 conventions, agreements and contracts with the WIPO (World Intellectual Property Organisation) in the field of Industrial Property Protection. Among them are as follows:

1. Convention Establishing the World Intellectual Property Organisation,
2. Paris Convention for the Protection of Industrial Property,
3. Patent Cooperation Treaty (PCT),
4. Madrid Agreement Concerning the International Registration of Marks,
5. Budapest Treaty on the International Recognition of the Deposit of Micro-Organisms for Purposes of Patent Procedure,
6. Locarno Agreement Establishing an International Classification for Industrial Designs,
7. Strasbourg Agreement Concerning the International Patent Classification,
8. Nice Agreement Concerning the International Classification of Goods and Services for the Purpose of the Registration of Marks. The SASMP is in the process of adopting European Patent Office (EPO) rules and principles, aiming for an association with the EPO.

Azerbaijan joined the Eurasian Patent Convention in 1995. A multilateral cooperation with EPO has been successfully realised.

Bilateral agreements are signed between Azerbaijan and some New Independent States of the Former Soviet Union.

Azerbaijan, like other Republics of the Former Soviet Union, benefits from several international research programmes and organisations: INTAS, US National Science Foundation's CRDF programme, STCU, NATO's Science for Peace, IAEA, etc. These programmes are actually assistance programmes focussing on research.

European Neighbourhood Policy

New prospects for a closer EU-Azerbaijan cooperation were opened after the inclusion of Azerbaijan in the European New Neighbourhood Policy (ENP) Initiative and further development of the ENP Action Plan aiming at contributing to sustainable economic development of the country. In the ENP Action Plan there is an article on the development of Azerbaijan's capacity in technological R&D to support the economy and the society. In this article it is written that the EU will help to develop a research and innovation policy directly relevant to the sustainable and equitable economic development policy objectives of Azerbaijan, including an appropriate programme of reforms in the scientific system of Azerbaijan and in the relevant regulatory framework. Amongst different elements of reform, steps will be taken to create a transparent and unbiased mechanism of competitive funding and management of scientific and technological research through, inter alia, open calls for proposals and an independent and high professional peer review evaluation process. It also contains an article stating the need for a closer integration of Azerbaijan into the European Research Area through a more active promotion of the participation of Azerbaijani research organisations in the EU's Framework Programmes.

Challenges

Challenge 1: Elaboration of the State RTD and Innovation Strategy

Issues of the systematic development of the scientific and technological complex of the country from the entire complex of organisational and economical issues in the innovative development of the Azerbaijan economy are the most important ones. Implementation of such development is a "mission impossible" without elaborating the state RTD and the innovation strategy.

Development of the country's sound and clear economic, scientific, and technical policy for a near-term outlook as well as for a long-term outlook is of actual necessity. Establishment of a full-scale innovative economy in which innovations related

with the advanced processing of natural resources will accompany all the stages of the reproduction process, from the creation of products and services, demanded by society and market, to the phase of completing effective cycles of their life activity, is the main vector of social and economical development in the 21st century.

There are many problems, which the present R&D organisation in Azerbaijan has failed to solve.

The most serious one is related to the fact that the quality of results obtained by Azeri researchers significantly lags behind world standards and that they have a weak link with Azerbaijan's socio-economic objectives (including the cooperation with businesses).

The Azeri RTD&I Strategy 2009-2015 should set objectives and measures to ensure high quality and an increased intensity of Azeri research and development, to increase the business sector innovativeness and the added value they create. The strategy and its implementation plan will provide the framework and the scope of the public sector with support measures until 2015, giving guidelines and motivation to research and development institutions and enterprises to plan and organise their activities in the long term.

It could be said without exaggeration that the absence of a sound and clear strategy of an innovative development of Azerbaijan is a clear and present threat to the national security of the country.

The only policy measure that addresses this challenge up to now is the Presidential order to create a governmental commission for the implementation of reforms in the Azeri RTD, the elaboration of a National RTD Strategy for 2009-2015, and the design of an appropriate programme for its realisation on 10 April 2008.

Challenge 2: Renewal of the Knowledge Basis, including the Improvement of Research Quality and Capacity for Innovation

In order to develop a knowledge-based society and economy, Azerbaijan needs researchers and engineers of high qualification and expertise, who will ensure the sustainability and competitiveness of the public sector R&D and of the higher education system, while at the same time constitute the quality of human resources for innovative entrepreneurship. Research and engineering careers must therefore be made more attractive for young people and experienced specialists, and measures must be taken to halt the brain drain, to guarantee that enough specialists receive doctoral degrees at universities and academic institutes, and to improve the possibilities for embarking on successful research careers.

Practically isolated, the RTD system of Azerbaijan is fragmented, as the various components tried to survive with a minimum of available resources, mainly by public funding, within mostly formal and autarkic systems.

Low salaries in the RTD system might be considered as a main reason for the low attractiveness, but in reality the reasons are more complex and are connected to the delayed institutional reforms, the poor quality of the research & development infrastructure, and the absence of an evaluation system fostering and compensating the real performance - the excellence. One of the strongest reasons could be considered the absence of clarity and transparency concerning the professional career.

Furthermore, the funding level had a negative impact on the maintenance and development of the research infrastructure needed for advanced research, for the achievement of valuable results at the international level and for the solving of complex problems being of national interest in the economic and social fields. This negative impact affected mainly the international cooperation and the participation in international research projects and networks, generating isolation, disconnecting Azerbaijan from the main European research goals and reducing the access to new products and technologies, which are necessary for the Azerbaijani industry and services. The managerial ability and the absence of minimal institutional resources for supporting research laboratories generated disfunctionalities even in places where a reasonably up-dated infrastructure has been available.

The modest results and the weak international cooperation capacity are reflected in the low number of articles in mainstream scientific publications, and citations of the scientific results published by Azeri authors, but also in the lack of interest towards the protection of intellectual property. The extremely low number of patent applications with Azerbaijani authors, both domestically, but particularly in Europe, the USA, and Japan confirms this situation.

No specific policy measures from the governmental level have been identified that fully respond to this challenge. This refers to both direct and indirect measures.

However, several policymeasures were undertaken which partly address this challenge.

Challenge 3: Increasing the Competitiveness of Traditional Industries by the Introduction of New Technologies

The latest research shows that 0.01% of Azerbaijan's enterprises have brought new or significantly improved products (goods/services) to the market or introduced new or significantly improved processes. In most of the enterprises the expenses on innovation are still used for the purchase of machines and equipment.

The majority of existing enterprises urgently need reconstruction and modernisation in the use of methods and technologies relevant to modern requirements and standards.

Azerbaijan's economy has made very rapid progress in recent years, supported by domestic demand, foreign direct investments and the increasing export.

However, even though Azerbaijan has been very successful in attracting foreign direct investment, most FDI has been made in sectors that are not particularly knowledge-and skill-intensive, but have lured foreign investors with available natural resources of big demand and low labour costs. Given that Azerbaijan is losing its competitive advantage, due to the depletion of oil and gas reserves it is crucial to create an attractive environment for knowledge-intensive foreign direct investments.

The analysis shows that competitive (non-natural resource sectors) industrial sub-sectors exist in Azerbaijan. These sub-sectors are as follows:

1. the chemical and petrochemical industry;
2. the food industry (including beverages and tobacco);
3. machine-building; and
4. the light industry.

There is a serious challenge in continuing to attract direct foreign investments, which have played a vital role in economic growth. Unfortunately, as a rule, the FDI in Azerbaijan did not promote economic restructuring and technological modernisation.

This challenge is addressed by a couple of specialised state programmes related to the development of some traditional industrial sectors and also by a number of state programmes that indirectly include issues and policy measures which may effect the traditional industrial development in the country. They are as follows: a long-term strategy to manage the oil and gas income in the Republic of Azerbaijan, a state programme on the development of a fuel-energy complex of the Republic of Azerbaijan (2005-2015), a state programme on poverty reduction and sustainable development in the Republic of Azerbaijan, a state programme on the development of SMEs, a state programme on the implementation of an employment strategy of the Republic of Azerbaijan (2007-2010) and the establishment of the "Azerbaijan Investment Company" JSC.

Challenge 4: Promoting the creation of new high-technology firms

The share of high-technology production in Azerbaijan is significantly lower in comparison to other EU countries. Approximately 3% of the output of the Azerbaijani industry is high-tech. Azerbaijan's high technology primarily consists of the production of communication equipment and, to a smaller degree, the production of computers and scientific equipment. Due to the relatively high labour intensity and lower capital intensity, Azerbaijan's high-technology production is characterised by a relatively low added value compared to a medium high technology.

As in the second challenge, finding qualified labour has become a serious problem for high- tech enterprises. The reason for this might be the fact that, on the one hand, the Azerbaijani education system produces a relatively small number of graduates with a technical education and, on the other hand, a relatively large number of Azeri researchers work in the academic sector.

An access to capital for start-up companies and companies with a great growth potential should be ensured.

It is worrying that Azerbaijan's export market is not very knowledge or skill-intensive. This leads to a low productivity and low incomes for entrepreneurs. Therefore, a diversified government support for innovative start-ups, but also for more mature companies that wish to move towards knowledge and skill-intensive activities, is extremely important as it leads to an increase in the added value created by companies.

This challenge is addressed by the following measures: National Information and Communication Technologies Strategy for the Development of the Republic of Azerbaijan (2003-2012), State Programme on Development of ICT in Azerbaijan Republic in 2005-2008 (Electronic Azerbaijan).

Existing EIS data for Azerbaijan allows calculating summary innovation index (SII) – a composite index calculated using EIS data – along with as many as 30 countries that participate in the annual EIS survey.
The SII for Azerbaijan shows that it belongs to a group of so-called 'laggards'. This terminology reflects the extremely low level of innovation activity in Azerbaijan. In order to understand this positioning and terminology, it is necessary to clarify a few conceptual issues.

SII as a composite indicator shows the extent to which growth in a country is based on innovation. SII does not necessarily relate to the economic growth of the country, especially not in the short term, but it shows the degree to which economic growth embodies innovation. Growth can also be based on innovation factors like economic efficiency, which is not reflected in innovation but in production capability. Furthermore, growth can be based on cheap and available labour or natural resources.

This latter factor is especially pertinent for Azerbaijan that is rich in natural resources. In its economy it is very difficult to initiate growth which is based on innovation since the economy is dominated by resource-based sectors, and relative prices and economic rents favour these sectors.

However, we should bear in mind that the EIS indicators are somewhat skewed towards the measurement of international innovation activities – and consequently SII calculations as well – which are marginal in 'laggards' economies, as one would expect. An alternative composite indicator, which takes much more into account the technology absorption as well as important technology acquisitions behind frontier innovation activities, would be a more appropriate reflection of technological activities in laggard countries.

Azerbaijan is clearly a laggard country in the sense that it is still faced with the challenge of building its innovation system. This is a task which may take a decade to implement but it is feasible for Azerbaijan to achieve. Being a resource-rich country, its main challenge is not a financial one but a politico-economic one diversifying the economy towards technology-intensive activities.

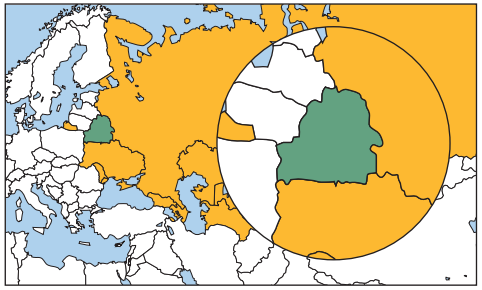
Further challenges

The lack of a clear RTD and innovation policy is responsible for the continuous marginalisation of research and development work and innovation activity in the country.

The main state body designing innovation activity in Azerbaijan is the Ministry of Economic Development. With the exception of this ministry, each ministry and the ANAS are supposed to develop their own innovation policy. Besides the state bodies, joint-stock companies, private companies and large companies also develop their innovation policy, proceeding from interests of their own business. Foreign experts are involved in the development of an innovation policy only in exceptional cases, as the additional financing for this purpose is required which is absent in the overwhelming majority of cases.

By appraisals of independent experts, the quality of a decision-making process in the development of an innovation policy in Azerbaijan is low. Accepted decisions are neither based on the careful analysis nor on the use of appraisal results or the use of indicators. There is no coordination between various departments interested in the realisation of any innovation programme in the development of an innovation policy.

I.3 Country Report Belarus



Current State of S&T and Major Policy Challenges

S&T Indicators

TABLE 8: S&T LANDSCAPE (2009)[81]

R&D Expenditure as % of GDP	Number of research organisations	Number of researchers
0.65	446	20,571

Research Structure and Policy

The legal basis in S&T and innovation policy is currently formed by ***443 operating legal acts*** issued by the Parliament, President, Council of Ministers and state bodies dealing with these issues. All these documents are available in Russian at the National Legal Internet-Portal[82]. The list of the basic acts includes such laws as:

- The Law of 19.01.1993 № 2105-XII "About the basics of the state science and technology policy";
- The Law of 21.10.1996 № 708-XIII "On scientific activities";
- The Law of 05.05.1998 № 159-Z "About the National Academy of Sciences";
- The Law of 05.05.1999 № 250-Z "About scientific and technical information";
- The Law of 17.05.2011 № 262-Z "On the author's right and related rights", as well as the Regulation of the Council of Ministers of 12.08.2010 #1326 "On selected issues of financing research, technology and innovation activities".

The Programme of Social and Economic Development of the Republic of Belarus for 2011-2015[83] states innovations and increase of investments to be a precondition of the country's growth. By the end of 2015, Belarus has to reach the following indices: 20-21% of innovative products in total shipped industrial products, 12-14% of innovative and high-tech products in the total export of products and services. The strategy of science, technology and innovation activities formulated in this document includes the following key tasks: developing effective national innovation systems, increasing innovative activities of companies and support to entrepreneurship and inventions. Their implementation will be based on

- Technological modernisation of key industries and productions, introducing science-based technologies (such as information, nanoelectronics, optical, thin chemistry, biological technologies, etc.) for manufacturing products with high added cost and low energy and material consumption, incl. productions based on hydrogen technologies;
- Development of the material resources of the national science sector, as well as training the highly qualified experts in the area of innovation activities;
- Increase of spending for R&D up to 2.5-2.9% of the GDP and the share of non-budget funding – up to 52-54% of the total funding. Within the last decade, the R&D system has undergone only a gradual change, with the relative shares of the 3 key sectors – higher education, business enterprises, and government – remaining largely unchanged in terms of employment and funding. At the same time, R&D employment increased by 5% in 2003-2008. The share of gross expenditures on R&D in GDP remained stable at around 0.7% of the GDP in the period 2001-2009. Government funding has remained roughly unchanged at around 0.35% of the GDP. During this period, the Belarus GDP rose very rapidly, so the stability of these shares is consistent with rapid increases in the amount of funding in nominal terms[84].

[81] Data for 2010 is not officially available yet.
[82] www.pravo.by/webnpa/webnpa.asp
[83] Approved by the Decree of the President of the Republic of Belarus № 136 of 11 April 2011, www.pravo.by/webnpa/text.asp?RN=P31100136.

- ***The structure of the Belarusian R&D system by discipline is strongly dominated by technical sciences.*** This predominant position concerns most of the sources of funding. 78% of all R&D organisations in industry are in the machine-building sector, where own funds (61%) are larger than budgetary funds (36%) as a source of financing. ***This strong specialisation is an asset to exploit, provided that it generates increasing returns through clusters, spill-overs and knowledge exchange.*** Despite numerous efforts are undertaken by the government to promote other disciplines that is reflected in the list of priorities, e.g. life sciences and biotechnologies, which are increasingly important on a global scale, are relatively poorly represented.
- Improvement of IPR protection system and developing mechanisms to support inventors;
- Strengthening interconnections between science and business through the creation of new forms of enterprises capable to implement the full cycle "research – development – manufacturing – market sales", etc.

The following ***thematic priorities of S&T activities for 2011-2015*** have been defined[85]: energy and energy saving; agricultural industry technologies and productions; industrial and construction technologies and productions; medicine, medical equipment and technologies, pharmaceuticals; chemical technologies, nano- and biotechnologies; information and communication, aviation and space technologies; new materials; effective nature management, resource saving and protection from emergency; defence and national security. These priorities are being realised throughout different types of programmes, as well as via international cooperation in science, technology and innovations.

The year 2010 and the beginning of 2011 were quite important for Belarus S&T policy making because of the need to assess the results of the activities within the previous budget cycle (2006-2010) and set up new priorities and programmes for the next 5 years. As a whole, by June 2011, this process has been finalised.

One of the key programmes under implementation is ***the State Programme of Innovative Development of the Republic of Belarus for 2011-2015***[86]. It contains a list of priority measures and projects, funding sources, executors and stakeholders with the overall goal to develop new and upgrade existing manufactures based on technologies of the V and VI technological levels (ICT, airspace industry, pharmaceuticals, microbiology and biotechnology, nanoindustry, nuclear energy). According to the Programme, by 2015, the shares of science-based and traditional products in Belarus should be comparable.

Besides, the list of programmes for 2011-2015 includes 28 state science & technology programmes and 6 regional ones[87] (synchronised with the priorities of the S&T activities), as well as 16 basic research and applied research programmes[88]. These programmes are open for participation of foreign partners (R&D centres, universities and companies), however, they participate at their own expense.

Due to limited internal funding and lack of investments, Belarus R&D actors and the system as a whole are excessively oriented towards the commercialisation of R&D results, to the point that it possibly sometimes undermines scientific excellence[89]. The second wave of economic and financial crisis which influences the Belarusian economy in 2011 has strengthened the need in innovations and investments more than ever before.

Important research organisations

The Belarusian R&D system reflects the legacy of the Soviet past, as the business enterprise sector is not the major R&D performer, in contrast to what is typical

[84] State Committee on Science and Technology (2009, 2010), Science, Innovation and Technology in the Republic of Belarus 2008, 2009, Statistical Books, Minsk.
[85] Approved by the Decree of the President of Belarus № 378 of 22 July 2010, www.pravo.by/webnpa/text.asp?RN=P31000378.
[86] Approved by the Regulation of the Council of Ministers of the Republic of Belarus № 669 of 26 May 2011, www.government.gov.by/ru/solutions/1652.
[87] Approved by the Regulation of the Council of Ministers of the Republic of Belarus № 116 of 1 February 2011, www.pravo.by/webnpa/text.asp?RN=C21100116.
[88] Approved by the Regulation of the Council of Ministers of the Republic of Belarus № 886 of 9 June 2010, www.pravo.by/webnpa/text.asp?RN=C21000886 based on the List of priority areas of basic and applied research approved by the Regulation of the Council of Ministers of № 585 of 19 April 2010 www.pravo.by/webnpa/text.asp?RN=C21000585.
[89] Innovation Performance Review of Belarus, United Nations. 2011. 149 p.

in market economies. Only 12.8% of R&D personnel work in industrial enterprises. R&D is dominantly (71.45%) undertaken in extra-mural R&D organisations, mainly in the ***National Academy of Sciences*** (NAS, www.nasb.gov.by).

Under the umbrella of the NAS 86 institutions have been united with more than 30% of the total number of researchers and the largest share of highly qualified personnel (58% and 67% of candidates and doctors of science of their total number in the republic). Besides R&D centres, the list of NAS's institutions includes some manufacturing companies and several science & production ones, such as the State Scientific and Production Amalgamation of Powder Metallurgy[90]. Another Belarus peculiarity is that the NAS is not only a leading R&D organisation but it also coordinates basic and applied research, as well as appropriate state programmes within the whole country thus partly playing the role of a ministry.

Involvement of universities in R&D activities is relatively low (8.2% of the total number of researchers, without medical universities). The leading role belongs to Belarusian State University[91], the largest classic university in Belarus, as well as to the National Technical University[92], the largest technical higher school.

More than half of all R&D organisations (53%) are located in the extra-mural R&D sector. However, the R&D system is, in principle, largely oriented towards enterprises. It could be characterised as a system of R&D for, but not in the industry. This feature of the Belarusian system has remained its strong characteristic.

In line with the overall structure of the economy, R&D is mostly conducted in state owned institutions (74%) while the private ones, though growing in number, are still not much visible on the national scene.

Current Trends & Challenges in International Cooperation

National Policies

There is no specific policy document on international collaboration in science, technology, and innovations. However, the key documents and programmes, e.g. the Programme of Social and Economic Development of the Republic of Belarus for 2011-2015, State Programme of Innovative Development of the Republic of Belarus for 2011-2015, etc. emphasise the role it should play in supporting the implementation of priority projects of public value, promotion of domestic S&T products in the global market, training personnel and developing the national S&T potential, as well as in bringing investments into the national economy and science, including FDI, grants, loans, etc. And this is not just a declaration: international S&T cooperation has got the special line in the state budget and gets 3-4% of budget spending for R&D annually.

Bilateral Agreements, Regional Network/Cooperation

Following the principle "We cooperate with those who are willing to cooperate with us", Belarus has got ***over 45 bi- and multilateral agreements on the governmental level*** on cooperation in S&T or, more widely, on economic collaboration, which S&T being integral parts thereof. They have covered almost half of the EU member states (Bulgaria, Cyprus, Czech Republic, Denmark, Germany, Hungary, Italy, Latvia, Lithuania, Poland, Slovakia, Romania, and also UK) and several associated countries (Israel, Macedonia, Turkey, Serbia), as well as the most important international organisations. Within the EU, ***Germany, France and UK are among the top partners,*** followed by Austria, Italy, the Netherlands, Poland and Switzerland. In 2004, the first and until now unique joint laboratory in Belarus was created with the support of ISTC: efforts of the Fraunhofer Society, Fraunhofer Institute of for Nondestructive Testing (IZFP), Saarbruecken/Dresden, Germany , National Academy of Sciences of Belarus and its Institute of Physics have been united for joint R&D in optical diagnostics. The joint Fraunhofer-Stepanov laboratory is based in the B. Stepanov's Institute of Physics, Minsk[93].

In the EECA region, Belarus has got governmental agreements with Armenia, Kazakhstan, Moldova, Russia, Tajikistan and Ukraine. Historically, ***collaboration with Russia is characterised by the higher indices,*** e.g. 55% of the NAS's international projects are carried out with Russia (followed by Germany and China with 9% and 8% accordingly[94]). In addition to numerous bi-lateral projects carried out using traditional schemes (inter-ministerial bi-annual S&T programmes, joint calls of foundations for basic research, inter-academic exchanges, etc), there is an instrument called "programmes of the Union State of Belarus and Russia" funded from the joint budget. Since 1998, it has become one of the key instruments for supporting bilateral S&T cooperation with Russia in such areas as supercomputers, biotechnology, space, laser technologies, machinery building, etc.

Having no official contacts to the US, Canada, and some other industrialised economies, Belarus tries to diversify its collaborations and expands contacts with China, South Korea, India, the Mediterranean region, Latin America (Argentina, Venezuela), and Arabic countries.

Within the EECA region, Belarus is a member of the 2 unions – Commonwealth of Independent States (CIS) and European-Asian Economic Cooperation (EurAsEC). At the moment, collaboration seems to be more alive within EurAsEC which managed to launch the first S&T programme "Innovative Biotechnologies" initiated by Belarus. However, both CIS and EurAsEC lack mechanisms and instruments to support the initiatives in the R&D sphere so far.

The number of agreements and direct contracts ***at the institutional level is hard to estimate,*** as there is no unique source for such kind of information, while appropriations may give wrong results due to different levels of international activity of institutions. Annually, ***ar. 450 international S&T projects are implemented in Belarus[95].***

European Neighbourhood Policy

Belarus, while covered by the European Neighbourhood Policy, does not participate fully in it. The principal objectives of EU cooperation with Belarus defined in the Country Strategy Paper (2007-2013) are to support the needs of the population, to directly and indirectly support democratisation, and to mitigate the effects of the isolation of Belarus on its population. The National Indicative Programme for 2007-2011 translates these objectives into two priority areas: i) social and economic development, including actions to alleviate the consequences of the Chernobyl catastrophe, and ii) democratic development and good governance. For the period 2007-2011, a total of €46.07 million has been allocated to Belarus.

Partnership and Cooperation Agreements (PCAs)

EU-Belarus PCA is not in force; that is the key barrier not only for developing official contacts but also for supporting initiatives at the national level aimed at developing cooperation with EU, e.g. national system of FP7 contact points, support for proposers, etc.

National and Bilateral Programmes

Bi-lateral cooperation in science and technology between Belarus and its partners within appropriate intergovernmental agreements is implemented through bi-annual programmes composed of joint R&D projects and scientific events. Each party funds its own participants. Belarusian partners of these projects are funded by the State Committee for Science and Technologies and/or Belarusian Republican Foundation for Fundamental Research. By 2011, Belarus has got such cooperation programmes with neighbouring Ukraine, Poland, Lithuania, and Latvia, as well as with Moldova, Kazakhstan, Serbia, China, India, and Venezuela.

Since 1998, cooperation with Russia, the largest S&T partner of Belarus has got a special instrument called "Programmes of the Union State of Belarus and Russia". One of the most successful examples is the family of programmes for developing supercomputers – "SKIF" (2000-2004), "TRIADA" (2005-2008) and "SKIF-GRID (2007-2010) - with its follow-up, "ORBISS" (2012-2015), which will result in developing the branch Belarusian-Russian infrastructure of supercomputer services.

EU Framework Programme for Research and Technological Development

The Belarus National Information Point for EU Framework Programmes was created in 2004 within the INTAS project. It works under the aegis of the State Committee for Science and Technology and is hosted by the Institute of System Analysis and Information Support of S&T Sphere[96]. With FP7 start, the national

[90] www.pminstitute.by/eng/
[91] www.bsu.by
[92] www.bntu.by
[93] www.ifanbel.bas-net.by

[94] 2010
[95] They are registered in the data base of international S&T projects monitored by the Belarusian Institute of System Analysis and Information Support of Scientific and Technical Sphere, www.belisa.org.by.
[96] www.fp7-nip.org.by

NCP system has been elaborated more or less similarly in terms of structure to EU member states. In 2011, it includes 10 thematic and 5 horizontal contacts based in different R&D centres and universities in Minsk. Belarus FP7 contacts are researchers and administrators. Being not supported by the national authorities as FP7 contacts, they put limited efforts to NCP activities.

By June 2011, Belarus participated in 170 applications that resulted in 27 projects. Total EC contribution is approximately €1.1 million[97]. The average success rate is 17%, however, it varies significantly from year to year and between themes. The most successful programmes are Information and Communication Technologies, Research Infrastructure and some schemes of the People Programme (International Research Staff Exchange Scheme).

European Neighbourhood Policy Instrument (ENPI)

ENPI enables Belarus to be a part of 3 cross-border cooperation programmes – Poland-Belarus-Ukraine, Lithuania-Latvia-Belarus, and Baltic Sea Region. In general, ENP's focus in Belarus gives a limited room for S&T cooperation with a bit more of opportunities in innovations. Support to innovations in the field of natural and technical science (but also to selected non-technical services), linkage of innovations to SMEs, and transnational transfer of technology and knowledge is one of the priorities of the Baltic Sea Programme within which currently 5 S&T-related projects are being implemented with the total budget for Belarusians of €620,000.

Lifelong Learning Programme (LLP)

TEMPUS, the oldest among LLP programmes in Belarus (since 1993) has resulted in 24 joint projects, of which 2 have been supported in 2010, and also in 4 structural actions. It plays a visible role in integrating Belarus higher education into the European universities' network, as well as in modernisation of the national higher education schools. The current national priorities in TEMPUS are focused on quality of education, academia-industry partnerships and international collaboration. However, Tempus remains as the almost only donor organisation left in the field of education in the country[98]. Between 1994 and 2006, the total budget allocated was €12.8 million[99]. In 2011, 10 projects are being implemented.

ERASMUS MUNDUS becomes more and more popular in Belarus, however it is still considered to be a new tool. In 2004-2011, 39 Master students and 4 Erasmus Mundus scholars have been supported. 4 scholarships were awarded for European Integration Studies at European universities and 8 scholarships – for studies at the College of Europe. Belarus also participated in the Erasmus Mundus Action II/External Cooperation Window between 2007 and 2009 (€5.3 million, 48 months). The partnership in the programme of the 2 Belarusian universities – Belarusian State University (Minsk) and Brest State University – gives their applicants more chances to be supported comparing to those students who study in non-partner universities. For the latter, the success rate in the last call was extremely low (1:90).

Comenius, Erasmus, Leonardo da Vinci and Grundtvig programmes do not work in Belarus.

Challenges

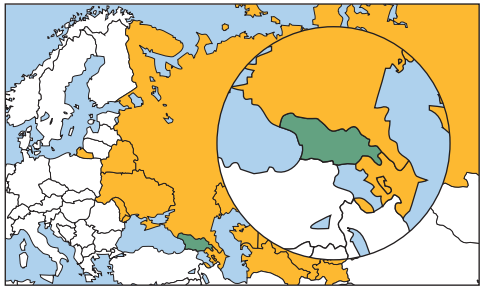
- Belarus has made important efforts in creating institutional relations with foreign partners, but a continuing attention in this area is required. ***International mobility of Belarusian researchers and, in particular, young scientists is low.*** This hampers creation of "a critical mass" of internationally active researchers, as well as knowledge and best practices exchange and developing personal networks that may result in joint projects. The picture differs from area to area with a much better situation in ICT comparing to, say, life sciences, engineering, and humanities. At the same time, permanent migration of scientists abroad may have negative implications for domestic scientific capabilities. ***Policies should recognise this potential downside and adopt measures that on balance increase the benefit of international mobility.***
- The fact that international cooperation in Belarus is supported by the Government confirms the understanding of its value by the national authorities. However, ***the number of financial instruments for allocating the public money is quite limited.*** The key instruments are
- funding the R&D of a Belarusian partner within a bi-lateral project, which is included in a bi-lateral programme of cooperation in science and technology between Belarus and some foreign countries;
- co-funding participation of R&D organisations in international S&T exhibitions in the country and abroad.
- ***Belarus should diversify its instruments for promoting the international collaboration*** beyond the support for joint research. Such instruments could cover international publications and patenting, proposal drafting, project-based mobility, networking, as well as information and consulting services aimed at promotion of international cooperation, and also dedicated structures.
- In Belarus, the public support for national network of FP contact points is lacking due to the absence of a legal basis of the Belarus-EU cooperation. However, Belarus is not unique: most of the Eastern European countries in which the dialogue with the EU is much more advanced do not fund their NCPs. Funding of NCPs' daily activities is crucial for the increase of national participation in EU programmes. None of us is able to work for free for years. ***Intermediate decision could be to provide support to the national NCP networks through Eastern Partnership.***
- Effective international cooperation calls for wide participation of ***different*** actors. However, current support mechanisms are limited to state-owned R&D centres. ***Spreading them on science-based SMEs*** for which the barriers are the most significant could facilitate international collaboration in S&T and positively influence the whole economy.
- Withdrawn, or reduced, international support for S&T cooperation with Belarus (e.g. Belarus cannot participate in the US' CRDF programme and Swiss SCOPES programme, which include other EECA countries. Germany, Poland, Switzerland and some other countries regulate the level of S&T bi-lateral collaboration with Belarus depending on the level of political cooperation) decreases opportunities for R&D organisations, companies and individuals in the international arena. ***This calls for more intensive and sustainable activities of R&D players to globally promote their advantages and cooperation potential.***

[97] For the contracts concluded before October 2010.

[98] www.eacea.ec.europa.eu/tempus/participating_countries/impact/belarus.pdf

[99] The Ministry of Education regulates all university and faculty activities, using a license system as a tool to close private universities. All international contacts, including permission for studying or travelling abroad as well as a permission to make use of an awarded Tempus grant, are also regulated by the Ministry of Higher Education. Although the initial adjustment of Belarus to the academic principles of the Bologna process was successful, in 2005 the country's participation in the process was suspended because of the breach to fundamental principles of higher education, in particular the observance of the university's autonomy and the development of the student self-management.

I.4 Country Report Georgia



Current State of S&T and Major Policy Challenges

Reforms in S&T being gradually implemented since 2004 have resulted in an adoption of new legislative acts and regulations; introduction of measures to stimulate cooperation between research, higher education and industry; establishment of the Georgia National Science Foundation with the main goal to allocate funds on a competitive basis and to develop diverse types of S&T supporting programmes (including joint activities with foreign vis-à-vis organisations)

In order to develop an effective science policy, the EU supported the project on "Creating an effective model of science administration: review of EU best practices and elaboration policy recommendations with the Ministry of Education and Science of Georgia" has been implemented under the leadership of the Archimedes Foundation (Estonia) in 2006-2007. The project has developed a set of recommendations geared to the modernisation of the country S&T landscape, an improvement of the Georgian legislative framework towards EU standards and the definition of a coherent S&T policy.

In 2010, Georgia proceeded with an optimisation of the S&T institutional structure focussing mainly on:
(I) further harmonisation of research and HE and
(II) improvement of funding schemes and instruments in support of innovative S&T.

Correspondingly, around 50 research institutes have been integrated into the country's main universities and thus nowadays research organisations of Georgia are represented by 25 universities, a Centre of Life Sciences and four research institutes of technical profile.

On the other hand, in accordance with the Presidential Decree #428 of 16 June 2010, Shota Rustaveli National Science Foundation (SRNSF) was established by merging two main funding entities: the Georgia National Science Foundation and the Rustaveli Foundation for Georgian Studies, Humanities and Social Sciences.

Nowadays, the following challenges can be considered a major concern of Georgian S&T policy makers, researchers and other stakeholders:

1. Lack of cooperation between research and industry;
2. Absence of institutional components (e.g. technlogical incubators) in support of commercialising research;
3. Insufficiency of a coherent innovation policy;
4. Reluctance of students to make an academic career, especially in hard sciences.

S&T Indicators

The table below gives a general landscape of Georgia's S&T in 2010 based on S&T indicators commonly used by the Ministry of Education and Science of Georgia (MES)[100].

Research Structure and Policy

Legal basis for national S&T policy: The S&T activities in Georgia are regulated by 2 main legal acts: "Law on Science and Technologies and their Development", and "Law of Georgia on Higher Education". Besides, "Law on National Academy of Sciences" highlights the scope of the Academy's activities. Georgia is a party to all the main international agreements concerning IPR and thus the legislative base of intellectual property protection comprises most of the elements necessary for its functioning. Allocation of funds in S&T from the state budget, including funding schemes of competitive granting is regulated by the governmental decrees.

General priorities of S&T policy: General priorities of Georgia's S&T policy can be represented as following:

[100] Source: MES and SRNSF

TABLE 9: S&T INDICATORS OF GEORGIA IN 2010

R&D expenditure as % of GDP	0.4
Share of government expenditure on R&D (%)	72
Share of HE expenditure on R&D (%)	27
Share of business enterprise expenditure on R&D (%)	0.3
Number of research organisations	31
Number of researchers (in public and private organisations)	3,200
Average researchers salary (in Euro)	250
Amount of scientific publications (according to ISI Database)	520
R&D investment dedicated to international cooperation (in Euro)	180,000
Percentage of researchers involved in programmes/ projects of international cooperation	16.5

(I) Building up a knowledge base for the economy;
(II) Developing research infrastructure;
(III) Supporting young talented scientists;
(IV) Facilitating international cooperation and
(V) Popularisation of science.

Main S&T fields: Currently the main thematic priorities identified by the Ministry of Education and Science of Georgia are as follows:
(I) Georgian Studies;
(II) Engineering Sciences and High-tech Materials;
(III) Information Technologies and Telecommunications.

Important Research Organisations

Ministry of Education and Science of Georgia: S&T policy of Georgia at governmental level is developed by the Ministry of Education and Science. Besides; the ministry coordinates the main financial stream lines for S&T from the state budget.

SRNSF: In close coordination with the ministry, the SRNSF develops S&T strategy mainly through elaboration of national programmes and identification of thematic priorities for cooperation with foreign partner organisations. In the scope of the national programmes, the SRNSF allocates funds to the groups of Georgian researchers and individual scientists by providing competitive grants.

National Academy of Sciences: Involvement of the National Academy of Sciences in S&T policy is outlined by advising to the government and identifying the country's priorities in science.

Universities: By developing their intramural S&T policy and strategy, the main Georgian universities (such as: the Ivane Javakhishvili Tbilisi State University, the Ilia State University, the Georgian Technical University, the Tbilisi State Medical University and the Agrarian University) have a tangible influence on the country's S&T policy, especially after having integrated around 50 research institutes into the university structure in 2010.

Besides, the leadership of the main universities is involved in the decision making process at local and national levels by participating in activities of various working groups, councils, ad hoc committees, etc. For example the quota of universities in the Science Board of SRNSF (the decision making body of the main funding institution of Georgia) is around 30%.

Private sector: Involvement of private and non-governmental organisations (e.g. the Georgian Research and Development Foundation – GRDF) in S&T policy is relatively small and differs from case to case.

Current Trends and Challenges in International Cooperation

National Policies

International cooperation is considered as a priority in the Georgian S&T and this statement is included in the "Law on Science and Technologies and their Development".

Participation in international R&D programmes apart from the establishment of a long-term fruitful cooperation with foreign colleagues provides a tangible financial support to Georgian researchers (around 70 million USD).

The main funding sources are listed as follows:

- NATO SPS – around 150 projects with an overall budget of 10.5 million USD;
- CRDF – around 170 projects with an overall budget of 7.5 million USD.
- ISTC – around 150 projects with an overall budget of 29.5 million USD.
- STCU– around 100 projects with an overall budget of 10.0 million USD.
- EU FP7 – around 30 projects with an overall budget (for Georgian participants) of 3.0 million USD.
- INTAS (before 2007) – around 220 projects with an overall budget of more than 6.5 million USD

Bilateral Agreements

Support of the international S&T cooperation is an integral part of practically all agreements on cooperation concluded by the Georgian Government with its foreign vis-à-vis. Besides, SRNSF (before 2010 GNSF) as one of the main S&T policy making and funding entities has signed a number of bilateral agreements with international/national S&T organisations. In particular these are:

- "Statement on Intent to Cooperate" with Science and Technology Centre in Ukraine (STCU), 2006;
- "Agreement on Scientific Cooperation" with U.S. Civilian Research and Development Foundation (CRDF), 2006;
- "Protocol on Scientific Cooperation" with French Centre National de la Recherche Scientifique (CNRS), 2008;
- "Agreement on Scientific Cooperation" with National Research Council of Italy (CNR), 2010.

Besides, an agreement on scientific cooperation between the SRNSF and the TUBITAK (Turkey) is being prepared and a revival of the "Agreement between the Government of the Hellenic Republic and the Government of the Republic of Georgia on Cooperation in the fields of Education, Science and Culture" (signed in Athens in 1994) is on the agenda.

Regional Network/Cooperation

Apart from the countries mentioned above, Germany, Finland, and Estonia can be considered as the main collaboration partners of Georgia in S&T. Georgian researchers are involved in German programmes opened for the third countries participation (e.g. IEBC and diverse instruments of the DAAD). The EU funded project "Creating an Effective Model of Science Administration" implemented in 2006-2007 by the Archimedes Foundation (Estonia) with participation of Finnish experts introduced EU best practices in R&D management and provided recommendations to the Government of Georgia for the development of a coherent S&T policy. Georgia benefits from opportunities offered by other European countries (e.g. Swiss R&D programme SCOPES) and takes part in the European-wide programmes such as ATLAS being implemented by the European Organisation for Nuclear Research (CERN). Since 2007 Georgia provides an annual contribution to CERN.

Being a participant of the European and international S&T programmes and projects, Georgia is involved in different S&T networks such as: GEANT and Idealist – in ICT, EECAlink – in health, IncoNet EECA and IncoNet CA/SC – in S&T policy, BS-ERA.NET – networking of S&T funding agencies of the Black Searegion, etc.

Many of the Georgian universities benefit from the membership in professional networks and associations practically in all fields of S&T. Besides, the universities collaborate with foreign partners by conducting joint programmes (e.g. exchange of PhD students) and research projects based on cooperation agreements.

Partnership and Cooperation Agreement (PCA)

Partnership and cooperation agreements between the EU and Georgia came into force on 1 July 1999 (Official Journal OJ L 205 of 4.8.1999). Title VI, Article 53 "Cooperation in Science and Technology" of the document declares the following:

1. The Parties shall promote cooperation in civil scientific research and technological development (RTD) on the basis of mutual benefit and, taking into account the availability of resources, adequate access to their respective programmes and subject to appropriate levels of effective protection of intellectual, industrial and commercial property rights (IPR).
2. Science and technology cooperation shall cover:
   (I) the exchange of scientific and technical information;
   (II) joint RTD activities;
   (III) training activities and mobility programmes for scientists, researchers and technicians engaged in RTD on both sides. The Parties, on the basis of mutual agreement, can engage in other forms of cooperation in science and technology.
3. In carrying out such cooperation activities, special attention shall be devoted to the redeployment of scientists, engineers, researchers and technicians which are or have been engaged in research and/or production of weapons of mass destruction.
4. The cooperation covered by this Article shall be implemented according to specific arrangements to be negotiated and concluded in accordance with the procedures adopted by each Party, and which shall set out, inter alia, appropriate IPR provisions.

National and Bilateral Programmes

Georgia is involved in the S&T strategy dialogue through participation in activities of regional organisations such as BSEC, GUAM, BSREC, etc. Besides, the country is a partner of the Black Sea Basin Joint Operational programme (BS JOP) and BS Cross Border Cooperation in which around 10 BS region countries are involved.

In 2010, SRNSF earmarked more than €10 million for implementation of the following national programmes:

- The State Grants for Fundamental and Applied Studies;
- Presidential Grants for Young Scientists;
- Grants for Outgoing Internship of Young Scientists;
- Grants for Research Infrastructure; (v) Short-term Individual Travel Grants;
- Grants for Organisation of Conference;
- Grants for development E-Dictionary and E-Scientific Journal.

The programme "The State Grants for Fundamental and Applied Studies" is open for participation of foreign researchers in the format of joint projects, yet the grants are provided only for Georgian participants.

The following S&T bilateral programmes are implemented in cooperation with foreign partner organisations:

- "Targeted R&D Initiatives Programme", partner STCU, thematic priorities:
  a) Biotechnologies and Life Sciences; b) New Materials; c) Information and Communication Technologies;
- "International Exchange Programme", partner CNRS, thematic priorities:
  a) Mathematics, b) Physics, c) Life sciences;
- Science and Technology Entrepreneurship Programme" partner CRDF, thematic priorities:
  a) ICT, b) Biotechnologies, c) Agrarian Sciences, d) New materials produced from local raw materials.
- Programme "International Research Groups", partner CNRS, thematic priority: Geosciences;
- "International Exchange Programme", partner CNR, all thematic priorities.

Several programmes are implemented by GRDF (by financial contribution of CRDF) in support of:

(I) research targeted on social and economic national concerns of Georgia;
(II) young scientists and engineers;
(III) business oriented scientists,
(IV) civilian research implemented by former weapon scientists to provide an alternative to their emigration from Georgia. In addition, GRDF administrates 4 mega projects funded by the USA under the Cooperative Biological Research Programme (CBR).

EU Framework Programme for Research and Technological Development

The network of FP7 NCPs in Georgia is represented by coordinating NCP (operating at SRNSF), NCP of the programme "People" and 5 thematic NCPs: health, food, ICT, nano-sciences and environment. Information support of researchers either on the institutional level or for targeted/thematic groups is provided by e-mail and FP7's national webpage as well as by periodical organisation of info days at the main scientific centres. Group and individual consultations are provided regularly.

By the end of 2010, a number of project proposals with participation of Georgian researchers/experts submitted to various calls of FP7 were above 130, while 26 projects (with participation of 37 Georgian organisations) were granted with a total EC contribution of almost €3 million.

European Neighbourhood Policy Instrument (ENPI)

In brief, the item 4.6.5 of "ENP Action Plan for Georgia" declares the following S&T fields as priorities:

(I) Reinforce human, material and institutional resources to improve the capacities in technological R&I;
(II) Restructure of the science management system
(III) Prepare Georgia's integration into ERA and implementation of an appropriate information

strategy to facilitate the adequate participation of Georgian scientists in the Community FPs.

(IV) Reinforce Georgian participation in international Marie Curie fellowships.

In 2010, contributions to all types of projects implemented in Georgia within the frame of ENPI made around €27 million.

In the frame of ENPI, especially under the twinning instrument, the Ministry of Education and Science of Georgia implements in cooperation with European partners the project "Capacity Enhancement for Implementing the Bologna Action Lines in Georgia" (CEIBAL). The overall objective of the project is to fully implement the Bologna process action lines within the relevant institutions and to prepare them for the integration into the European Higher Education Area (EHEA).

In 2010, a number of projects with the participation of Georgia were granted in the frame of various European programmes. In particular:

TEMPUS programme has provided grants to 8 Georgian universities under the instruments: Joint European Project - JEP (10 projects) and Structural Measures – SM (2 projects).

Lifelong Learning Programme (Jean Monnet Programme, Key Activity 1) granted the project "Improvement of the European Innovation Policy Study in Georgia"; Beneficiary/Contractor - ESIDG. Further education reforms including higher and secondary vocational education and training were announced. In 2010, thanks to Erasmus Mundus grants, 63 Georgian students and academics could pursue studies in EU universities.

Marie Curie Fellowships is represented by:

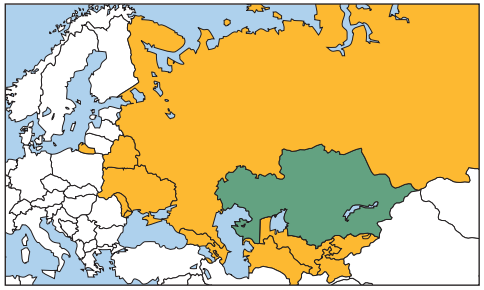
- Incoming international fellowship (IIF), GE fellow visiting IT for 1.5 years, then returning to GE, physicist;
- Transfer of knowledge projects (TOK) with Poland (2 projects) researchers in both directions, physics and mathematics;
- GE fellow recruited by BE training network, physics; (IV) GE fellow recruited by EL training network, physics.

Challenges

The major challenges in international cooperation Georgia is currently facing are presumably as follows:

1. Insufficient awareness/utilisation of the best/good European and international practice for the development of a coherent national S&T policy and strategy.
2. Lack of expertise of local S&T stakeholders (including policy makers) of the "rules of the game" in S&T at European and international levels.
3. Insufficient direct/bilateral and sustainable cooperation of Georgian researchers and engineers with their foreign colleagues.
4. Need in effective funding instruments geared to encouragement of international cooperation at institutional and individual levels (e.g. financial support of bottom-up initiatives, exchange of researchers, internships of young promising scientists abroad).

I.5 Country Report Kazakhstan



Current State of S&T and Major Policy Challenges

S&T Indicators

Main paper of Kazakhstan, which determines the S&T indicators is the Order of the Government of the Republic of Kazakhstan № 1291 adapted on 30th November 2010 "About the approval of inter-branch programme of research and technology development of the country until 2020".

The documents state that currently most R&D projects are realised in the agrarian sector (3.040), then in metallurgy (790), and in the oil and gas sector (79). Analyses of R&D indices of the thematic priorities show that the agrarian sector (64 or 18%) and the metallurgy (35 or 6%) realised most of the projects. Yet the number of R&D projects, which are ready to be realised in industry, is very low. There are 165 R&D proposals recommended for the industrial application in the field of oil and gas industry, the mining complex, the coal industry, the agrarian and energy complex, the pharmaceutical, chemical and petrochemical industry, and biotechnology and medicine.

In general, there is still a disproportion between research, development, design and production, because 45.1% of all research institutions are aimed at basic research, and only 6.4% of the total number of institutions are R&D institutions.

Research Structure and Policy

The state scientific and technical policy of the Republic of Kazakhstan in the long-term and intermediate-term

TABLE10: S&T LANDSCAPE (2009)[101]

R&D Expenditure as % of GDP	Number of research organisations	Number of researchers
0.16	424	17,021

perspective is oriented on solving major national problems: providing the country with foodstuffs, materials, energy, guarantee of national safety, increase of the quality of public health services, preservation of environment, stimulation of employment of the population, development of transport and communication, increase of the competitiveness of the economy on the basis of the development and application of advanced technologies to the leading branches of science.

Since June 2007, Kazakhstan implements the State Programme on Science Development in Kazakhstan for 2007-2012[102]. The aim of the programme is to achieve a competitive and balanced system of science providing a high level of knowledge relevant for a sustainable socio-economic development of the country. Main goals of the research system included in the programme are the modernisation of the RTD management system and the RTD infrastructure as well as its legal background and increasing governmental financial support for RTD.

In 2010, the Government of Kazakhstan adopted a new state programme for accelerated industrial-innovative development of Kazakhstan for 2010-2014[103], elaborated in accordance with the key areas of the Strategic Plan of Development of Kazakhstan until 2020, which is the second stage of the Kazakhstan Development Strategy up to 2030. The programme is aimed at ensuring the sustainable and balanced economic growth through diversification and an increased competitiveness. In 2015, the main priority of the rapid industrialisation will be the implementation of major investment projects in the traditional export-oriented sectors, with stimulation of new business opportunities for small and medium-sized businesses through the purposeful development of local content, subsequent redistribution, and recycling. Systematic measures of the economic policy will focus on the formation of a favourable macro environment and an investment climate, but also on measures to improve productivity and competitiveness of the national economy.

Context of the research policy in Kazakhstan for the period 2007-2012 is divided into the following two stages: 1st stage – stage of the institutional modernisation: 2007-2009, and 2nd stage – stage of a sustainable development – 2010-2012.

Most important issues of the first stage of the institutional modernisation aim to achieve best results in the unified coordination and management of the scientific-research programme; identification of real scientific research priorities; balanced funding of research by public and private sectors through calls for proposals and tenders; re-orientation of research to product competitive products on scientific market; and increasing the role of RTD along with increasing the international scientific cooperation inline with other about twenty tasks listed in the Governmental Programme. This stage also includes specific activities to increase knowledge and skills of the scientific staff and bringing the Kazakh research closer to international standards via the identification of national scientific and technology indicators and supporting the research and technology transfer.

The second stage foresees a number of activities towards the joining of Kazakhstan to the 50 competitive countries of the world by the index of knowledge using in economy, which will include, along with the implementation of international RTD standards in usual practice of national scientific institutions, making national research priorities attractive for foreign investors. The most important issues of this stage are increasing the domestic technology development realised by domestic companies up to 50%, and finally the increase of GDP up to 50% by ratio of RTD structure of GDP by 2012.

By the end of 2010, the Kazakh Government has adopted the State Programme for the accelerated industrial-innovative development of Kazakhstan for 2010-2014, which identified key policy priorities for the forced industrialisation. Main content of the programme is a tool to realise large investment projects in the traditional export sectors, with creation of new business opportunities for small and medium-sized businesses through the purposeful development of local contents, the subsequent redistribution and recycling.

In February 2011, Kazakhstan adopted a new law "On Science"[104] assigned to regulate relations in the field of science and scientific and technological activities, the definition of basic principles and mechanisms of functioning, and the development of the national scientific system. It has the following main components:

- Involvement of leading researchers into decision making process in research, technology, and innovation development to identify research and technology priorities of the country properly by the creation of national scientific councils and expert groups in certain priority fields. These councils and groups will be responsible for the national review of RTDI, and will develop analysis and reports in purpose of the identification of relevant funding for research, technology, and innovation.
- Acceleration of innovative development to implement research results into the modern economic and social system by creating an uninterrupted circle of education, science, and industry.

The new law "On Science" identifies new research funding tools, such as grants for basic research and industry-targeted activity. The public research institutions and universities have the right to spend means of grants to improve their scientific infrastructures and utilities, information and communication needs, staff expenses, and specific research needs. The funding can be provided based on calls for proposals and tenders.

Research Policy: Objectives and Priorities

Main branches of the Kazakh economy are oil and gas, mining-metallurgical complexes, and agriculture. Therefore scientific and technology programmes should first of all supply the development of these branches, including the programmes on petrochemistry, oil and gas and mining-metallurgical engineering. In 2002, the government of Kazakhstan, taking into

[101] According to the Kazakhstan Agency for Statistics. www.stat.kz
[102] Presidential Decree of 20.06.2007 N 348 „On State Programme of Science of the Republic of Kazakhstan as 2007 - 2012"
[103] Presidential Decree , Republic of Kazakhstan March 19, 2010 № 958
[104] Presidential Decree , Republic of Kazakhstan , February 18, 2011 № 407-IV

account the needs of the socio-economic development of the country and tendencies of the development of global science, has adapted five priorities of research, which are still current and will not be changed until 2012. It is clearly described in the previous country report.

The State developed long-term and medium-term scientific and technical programmes to encourage national research in studying the most important issues of food maintenance for the country; material providing; energy; national security; quality of the health care system; employment of the population; transport and communications development; competitiveness of the economic system.

Main research stakeholder of Kazakhstan is the High Scientific Technology Committee (HSTC) headed by the Prime Minister of Kazakhstan. The Committee includes all ministries of Kazakhstan, which are responsible for the research development in certain priority fields. Any decision of the committee has to be approved by the Parliament of the Republic.

The Government of Kazakhstan is going to increase public spending on science and innovation up to 1% of the GDP by 2015, of which 60% will be spent for research and technology projects. Today, science funding is equal to 0.16% of the GDP.

Current S&T funding is shown in the table below and includes the following figures:

- 59.0% – means of the state budget
- 16.5% – means of regional budgets
- 0.3% – means of institutes of development
- 22.4% – private budgets
- 1.2% – other incomes
- 0.6% – means of foreign investors

Important Research Organisations

The S&T development in Kazakhstan is coordinated by the Ministry of Industry and New Technologies and by the Ministry of Education and Science.

The State Statistic Agency of Kazakhstan has registered 424 research organisations engaged in S&T development. Among them, in accordance with the Government Programme on scientific development of the Republic of Kazakhstan 2007-2012, 5 national scientific laboratories for shared use and 15 laboratories of engineer profile[105] and 41 research entities included into the system of the Ministry of Education and Science were created. And the rest of the research institutions belongs to different ministries of Kazakhstan such as the Ministry of Industry and New Technologies, the Ministry of Health, the Ministry of Agriculture, the Ministry of Oil and Gas, the Ministry of Environment, etc. The structure of the Ministry of Education and Science includes 132 national universities in Kazakhstan[106], of which 22 are involved in S&T.

Analysis of the participation of the Kazakh SMEs in FP7 calls shows that 23.53% of the total KZ grant holders are SMEs. Main financing institutions of Kazakhstan, which provide venture capitals for SME in R&D, are the National Innovation Fund and the National Fund to Support SMEs.

In general, the distribution structure of organisations engaged in S&T fields looks as follows:

- Private non-commercial sector – 23.6%
- Business sector – 25.5%
- Sector of high education – 28.5%
- State sector – 22.4%[107]

Current Trends & Challenges in International Cooperation

National Policies

The national programme "Kazakhstan-2020" aims to develop an innovative economy and identifies five positive trends in the Kazakh economy[108] as follows:

1. Energy efficiency
2. Growth of non-raw material sector
3. Agro-industrial complex
4. Support of SMEs
5. Growth in labour productivity

The Government of Kazakhstan recognised that enhancing and strengthening the international cooperation will play a very important role in achieving these goals. International cooperation in research, science and technology are regulated by the Law of Kazakhstan "On Science" chapter 7, article 29. The cooperation is based on international agreements and contracts. There are more than 140 agreements and contracts with different countries on research cooperation. It is necessary to note that any international grant agreement in Kazakhstan is free from any local taxes and duties, with the exception of individual incomes in accordance to the Tax Code of Kazakhstan.

Article 29 of Chapter 7 of the Law "On Science" of the Republic of Kazakhstan accepted on 18 February 2011 states the following:

1 International cooperation is based on relevant international treaties, international scientific, technical projects and programmes, as well as on promoting the establishment and expansion of scientific and technical cooperation between Kazakhstan and foreign scientific organisations or others.
2 The subjects of scientific and (or) scientific and technical activities shall have the right to join international scientific, technical organisations and associations, to participate in international academic, scientific and technical projects and programmes of scientific, technical projects and programmes in foreign countries.
3 On the territory of the Republic of Kazakhstan,, scientific organisations and research centres with the participation of foreigners, stateless persons and foreign legal entities can be created in the established order.
4 Foreign investments in science and technology are made in a manner and form prescribed by the laws of the Republic of Kazakhstan.
5 The state authorities of Kazakhstan have control over the transfer of scientific and (or) scientific and technical results, as well as scientific and (or) scientific and technical products from the territory of the Republic of Kazakhstan in accordance with the laws of the Republic of Kazakhstan.

The new law on science foresees participation of foreign researchers in national calls for proposals. Participation of scientists in different activities of the Kazakh research mainly includes scientists from EECA. Scientists from far foreign countries participate in the projects based on bilateral and multilateral agreements.

Still, Kazakhstan has neither bi- nor multilateral or joint calls for proposals or tenders launched together with the EU excepting joint calls with INTAS launched in 1996 and 1997. These good opportunities for the Kazakh researchers are under consideration of the Government.

The Government of Kazakhstan has adapted a number of laws concerning the IPR based on section V of the Civil Code of the Republic of Kazakhstan "Intellectual Property Rights":

- "About copyrights and allied rights"
- "The Patent Law"
- "About trade marks, service marks and designations of places, from which productions originate"
- "About breeding achievements"
- "About topology of integral micro schemes"

On 9 June 2011, the Kazakh Parliament ratified an agreement of the Customs Union (Russia, Kazakhstan, and Belarus) on unified principles of the IPR protection.

Chapter 3 of the Law of the RK about Science foresees four articles concerning the IPR:

- Article 11, Subject of the IPR
- Article 12, Subject of the scientific IPR
- Article 13, Right of authorship for results of research and scientific-technology activities
- Article 14, Non-property and property rights of persons regarding the results of research and/or scientific technology activities

Any international research projects in Kazakhstan are free from any taxation in Kazakhstan in accordance to the Tax Code of the RK. There are no duties on the import of scientific equipment in accordance to the Tax Law of the RK.

Bilateral Agreements

Cooperation with EECA Countries

A number of bilateral cooperation agreements have been concluded between Kazakhstan and the EECA countries, such as Azerbaijan, Belarus, Kyrgyzstan, Russia, Turkmenistan, Ukraine, and Uzbekistan in different fields of education and science: seismology, metallurgy, oil, gas, economy, linguistics, exchange of students and teachers, recognition of high school diploma between the countries and others. Most important of them are:

- Kazakhstan - Russia cooperation agreement in the humanitarian sphere for 2007-2010 (signed on 4 October 2007, in Novosibirsk, Russia)
- Kazakhstan - Russia cooperation agreement on cooperation in culture, science and education, signed on 28 March 1994
- Kazakhstan - Russia cooperation agreement on

[105] www.scedu.kz/ru/nauchnye_laboratorii/
[106] www.edu.gov.kz
[107] According to the Kazakhstan Agency for Statistics. www.stat.kz
[108] Presidential speech, Republic of Kazakhstan, July 4, 2011.

science and technology development, signed on 25 November 1996
- Kazakhstan - Belarus cooperation agreement in the field of higher and postgraduate education, entered into force on 29 October 2009
- Kazakhstan - Ukraine cooperation agreement on education and science (14 September 2010)
- Kazakhstan - Tajikistan cooperation agreement on higher education (30 May 2008)

Cooperation with EU-member States and Associated Countries

Kazakhstan has concluded bilateral cooperation agreements with Bulgaria, Germany, Greece, France, Poland, Spain, Turkey, and the United Kingdom. All of these agreements foresee joint research, exchange of students and teachers, creation of equal conditions for students and tutors, and many other things included in the agreements, as well as the joint participation within the EU Framework Programmes, and activities included in DCI, LLP, and ENP instruments.

In this group of countries, Kazakhstan traditionally closely cooperates with Germany. Based on the bilateral agreement between the countries, institutions of Kazakhstan will participate in activities of the GTZ, the BBZ, and the DAAD.

Since its independency, Kazakhstan has established close cooperation with the United Kingdom, especially in the field of RTD, about 45% of projects funded under the EU-FP are coordinated by UK institutions.

DCI is a programme supported by the EU Delegation in Kazakhstan, and is well known within the country thanks to its previous activity under TACIS projects. Mainly, the DCI projects are foreseen for social and political issues, and thus do not include special parts for research and scientific tasks. But the projects include some research data.

At the DCI Workshop organised by InExCB-Kz under INCONET-EECA on 25-26 March 2010 in Almaty it was decided to let research institutions participate in DCI projects. Last DCI calls show that there is still no specific research activity.

	Country	Agreement
1	Austria	Agreement between the Government of the Republic of Kazakhstan and the Austrian Federal Government on economic, agricultural, environmental, industrial, technical and technological cooperation. Vienna, 10.09.04. Entered into force on February 1, 2011
2	Bulgaria	The Treaty on Friendly Relations and Cooperation between Kazakhstan and the Republic of Bulgaria. Almaty. 30/07/93. Entered into force July 30, 1996
3		The regulation of the Kazakh-Bulgarian intergovernmental commission on trade-economic and scientific-technical cooperation. Sofia, 3/13/98. Entered into force March 13, 1998
4		Agreement between the Government of the Republic of Kazakhstan and the Government of the Republic of Bulgaria on cooperation in health and medical science. Astana 25.09.03. Entered into force March 12, 2004
5	Hungary	The Treaty on Principles of Friendly Relations and Cooperation between the Republic of Kazakhstan and the Republic of Hungary. Budapest, 07.12.94. Entered into force November 26, 1996
6	Germany	Agreement between the Republic of Kazakhstan and the Federal Republic of Germany on the development of large-scale cooperation in the field of economy, industry, science and technology. Bonn, 22.09.92. Entered into force on January 11, 1994
7		Agreement between the Government of the Republic of Kazakhstan and the Government of the Federal Republic of Germany for further cooperation for the development of Kazakh-German University in Almaty. Astana, 03.09.08. Entered into force on August 20, 2010
8	Greece	Agreement between the Government of the Republic of Kazakhstan and the Government of the Greek Republic on economic and technological cooperation. Athens, 07/16/01. Entered into force June 4, 2003
9	Denmark	Protocol on establishing diplomatic relations (between the Government of the Republic of Kazakhstan and the Government of the Kingdom of Denmark). Almaty, 05/07/92. Entered into force upon signature
10	Spain	Agreement on strategic partnership between Kazakhstan and the Kingdom of Spain. Astana, 02.07.09. Entered into force on September 1, 2010
11	Italy	Agreement between the Government of the Republic of Kazakhstan and the Government of the Italian Republic on Cultural and Scientific Cooperation. Almaty, 09/16/97. Entered into force May 11, 2000
12	Cyprus	Protocol on establishing diplomatic relations between Kazakhstan and the Republic of Cyprus. Moscow, 02.04.92. Entered into force upon signature
13	Latvia	Agreement between the Government of the Republic of Kazakhstan and the Government of the Republic of Latvia on economic and scientific-technical cooperation. Astana 08.10.04. Entered into force March 17, 2006
14	Lithuania	Agreement between the Republic of Kazakhstan and the Republic of Lithuania on mutual understanding and cooperation. Almaty, 11/07/93. Entered into force March 13, 1996
15	Luxemburg	Agreement between the Government of the Republic of Kazakhstan on the one hand and the Belgian-Luxembourg Economic Union, on the other side about mutual encouragement and protection of investments. Almaty, 04/16/98. Entered into force on February 6, 2001
16	The Netherlands	Agreement between the Government of the Republic of Kazakhstan and the Government of the Netherlands on cooperation and mutual administrative assistance in customs matters. The Hague, 11/27/02. Entered into force on August 1, 2005
17	Norway	Protocol on establishing diplomatic relations between Kazakhstan and the Kingdom of Norway. Oslo, 05.06.92. Entered into force upon signature
18	Poland	Agreement between the Government of the Republic of Kazakhstan and the Government of the Republic of Poland on economic cooperation. Astana 06.07.05. Entered into force on January 21, 2006
19		Agreement between the Ministry of Ecology and Bio-resources of the Republic of Kazakhstan and the Ministry of Environment, Natural Resources and Forestry of the Republic of Poland on the issue of transboundary movement of hazardous wastes. Almaty, 24/04/97. Entered into force upon signature
20	Romania	The regulation of the Kazakh-Romanian intergovernmental commission on trade-economic relations and scientific cooperation. Bucharest, 4/25/96. Entered into force upon signature
21	Slovenia	Agreement between the Government of the Republic of Kazakhstan and the Government of the Republic of Slovenia on cultural cooperation. Almaty, 01/18/94. Entered into force on February 24, 1997
22	Turkey	Protocol on the establishment of the Intergovernmental Commission on Economic Cooperation between the Government of the Republic of Kazakhstan and the Republic of Turkey. Ankara, 02.09.93. Entered into force upon signature
23		Protocol between the Republic of Kazakhstan and the Republic of Turkey on the transfer of the use of the Republic of Kazakhstan property located in the county of Kemer, Antalya province. Ankara, 13.12.93. Entered into force November 19, 2007
24		Agreement between the Government of the Republic of Kazakhstan and the Government of the Republic of Turkey on cooperation in science and technology. Ankara, 04.03.97. Entered into force on 9 June 1997
25		Agreement between the Government of the Republic of Kazakhstan and the Government of the Republic of Turkey on trade-economic and technical cooperation. Almaty, 10/09/97. Entered into force on 22 May 2000
26		Cooperation Agreement between the Government of the Republic of Kazakhstan and the Republic of Turkey in the field of medicine and public health. Almaty, 10/09/97. Entered into force July 16, 1999
27	France	Treaty of friendship, mutual understanding and cooperation between Kazakhstan and the French Republic. Protocol on economic cooperation between the Government of the Republic of Kazakhstan and the Government of the French Republic. Paris, 23.09.92. The Treaty entered into force on November 12, 1994
28	Sweden	Agreement between the Government of the Republic of Kazakhstan and the Government of the Kingdom of Sweden on trade relations. Almaty, 23/03/94. Entered into force on September 1, 1994
29	Estonia	Agreement between the Government of the Republic of Kazakhstan and the Government of the Republic of Estonia on economic and scientific-technical cooperation. Astana 07.09.09. Entered into force on 4 March 2010

The EU and Central Asia: Strategy for a New Partnership

The EU has strengthened its relationship with the Central Asian countries since the adoption of "The EU and Central Asia: Strategy for a New Partnership" by the European Council in June 2007 (Central Asian countries: Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan). The strategy strengthens relations in all areas of cooperation, including through the reinforcement of EU-Central Asia political dialogue with regular meetings of the EU and Central Asian Foreign Ministers, the reinforcement of dialogues on human rights, the cooperation in the areas of education, rule of law, energy and transport, environment and water, common threats and challenges (including border management and combating drug trafficking), and trade and economic relations. The strategy is supported by a significant increase in EU assistance.

The main directions of cooperation of the European Union and the Republic of Kazakhstan in the sphere of education are described in the "EU Strategy for Central Asia: Updated priorities for Kazakhstan " for 2007-2013. It includes the development of cooperation between the leading universities and partners in the European Union (student exchange and scholarship) and the development of professional-technical education (participation in the programmes of the European Training Foundation).

Partnership and Cooperation Agreements (PCAs)

The Partnership and Cooperation Agreement (PCA) with Kazakhstan has been the legal framework for EU-Kazakhstan bilateral relations since it entered into force on 1 July 1999. In November 2006, a Memorandum of Understanding on cooperation in the field of energy between the EU and Kazakhstan has been signed establishing the basis for enhanced cooperation.

The future European Commission assistance will focus on the following priority areas: promotion of the ongoing reform process at political, economic, judiciary and social level, infrastructure building, and cooperation in the energy sector.

In the last decade, developing good relations with Kazakhstan has become an ever more important priority for the European Union — driven by Kazakhstan's growth as a reliable energy supplier and the country's rising profile on the international scene.

Negotiations on a new agreement on an enhanced partnership and cooperation between Kazakhstan and the European Commission were launched in Brussels on 26 June 2011 during the 12th session of the Cooperation Committee "Kazakhstan – European Union". This document, which will replace the current agreement signed in 1999, will take further ahead the Kazakh-EU bilateral interaction and will include unexplored areas of cooperation.

HE Mr. Norbert Jousten, Ambassador, Head of EU Delegation in Kazakhstan, in his recently published article "Kazakhstan – European Union: Strategy of Partnership" clearly described the strengthening of the cooperation between the EU and Kazakhstan:

Research and innovation are key elements for an industrial modernisation programme. In this area we have also an ongoing cooperation through the European Union's chief instrument for funding research, the Seventh Framework Programme for research and technological development (FP7). We consider that the current level of Kazakh involvement in FP7 is below its potential, but we appreciate the signs telling that interest is increasing. As Kazakhstan is an International Cooperation Partner Country, all Kazakh research entities are eligible for funding by the European Union for their participation in projects, and so enjoy the same rights and obligations as those entities established in the EU Member States.

EU grant assistance to Kazakhstan has played an important role since 1991 in the support of Kazakhstan's development and in support of the EU-Kazakhstan relations. Since Kazakhstan has become independent, more than 300 projects amounting to €140 million have been funded. The biggest share of these funds has been and continues to be allocated to policy advice and technical assistance as well as in support of people-to-people contacts.

Currently, more than 50 EU-funded projects address important topics in six broad priority sectors defined by the "EU Central Asia Strategy for a New Partnership": 1. Human rights, rule of law, good governance and democratisation; 2. Investing in the future: youth and education; 3. Promotion of social and economic development, trade and investment; 4. Strengthening energy and transport links; 5. Environmental sustainability and water; 6. Combating common threats and challenges. In all of these areas, the EU has established close cooperation links with national authorities, private sector, and civil society.

Some of the projects are regional projects involving other Central Asian countries. Technical assistance in the energy sector is provided at the regional level under the Baku Initiative within the framework of the INOGATE programme on the convergence of energy markets, energy security, and investment attraction. An important aspect of the cooperation is the enhancement of the environment protection in the oil and gas industries through an improved legislative and regulatory framework.

Other ecological challenges are focused as well through the EU-Central Asia Environmental Dialogue and subsequent concrete actions, especially in the field of climate change mitigation and the integrated water resources management. The main operational activities in the area of education include the Erasmus Mundus academic mobility programme, the Tempus programme on modernisation of higher education, support programmes of vocational education and research institutions.

In terms of specific goals for our grant based national cooperation, the Government of Kazakhstan and the EU agreed to focus in the coming years on the local development, the reform of public administration and the reform of the judiciary system, to support the rule of law in the country. This reflects our common understanding that no long-term economic prosperity is possible without a transparent and effective political and administrative system, the rule of law and an independent and competent judiciary. At the same time, this will foster social cohesion, democratic progress and respect of human rights. Since 2008, the EU has established an annual Human Rights Dialogue with Kazakhstan's national authorities, preceded by regular meetings with the local NGOs and annual regional seminars bringing together the EU and Kazakhstan civil society on various topics such as women's rights or the judicial system and places of detention.

Through open call for proposals, Kazakhstan NGOs can benefit from EU grants of about €1 million per year under the European Instrument for Democracy and Human Rights aimed at promoting transparency of political and economic processes and respect of human rights. The EU also considers the final Declaration of the December 2010 Astana OSCE Summit and Kazakhstan's July 2010 UN review of its commitments under the International Covenant on Civil and Political Rights (ICCPR) as important benchmarking tools for our cooperation.

The partnership between the EU and Kazakhstan is also a commitment to work together on global challenges.

Both the EU and Kazakhstan are currently taking stock of their achievements and consider an upgrading of the Partnership and Cooperation Agreement to reflect the progress achieved and to tackle the challenges ahead. Kazakhstan is a key partner for the EU and we look forward to continue and enhance our relations.

The overall EU cooperation objectives, policy responses and priority fields for Central Asia can be found in the EC Regional Strategy Paper for Central Asia 2007-2013. In addition to the assistance under the Development Cooperation Instrument (DCI), Kazakhstan participates in several ongoing regional programmes.

FP7 NCP Structure in Kazakhstan

The National Coordination Board on cooperation with the European Union Framework Programmes on research, technology, and innovation development was created on 22 July 2010 by the order of the Ministry of Education and Science. Eight thematic and three horizontal programmes NCPs were appointed.

A number of local Kazakh institutions participate in the FP7 projects and networks, through which most trainings and info days are provided. The FP7 National Coordinator Office hosted by InExCB-Kz has developed a special local programme for the training of trainers and cascade trainings to cover most institutions of Kazakhstan. The consulting service for the FP7 is realised by the FP7 NCPs. Its structure includes the FP7 National Coordinator office in Almaty and Astana, Thematic NCPs offices in Almaty, Astana, and Kurchatov.

FP7 research and CSA projects are co-funded by local partner organisations. There is no financial support received from the government. Some NCPs activities are co-financed by the hosting organisations. FP7 NCPs in Kazakhstan are not able to fulfil all their tasks to make awareness and information on FP7 priorities and calls for proposals as well as to participate in the FP7 events organised in the EU/AC countries without special political and financial support of the government. Now this issue is under consideration of two Kazakh ministries: the Ministry of Education and Science and the Ministry of Industry and New Technologies.

Challenges

Kazakhstan still needs to strengthen the cooperation framework with the EU RTD programmes as well as with the EECA countries. First of all there is need to overcome some barriers, such as:

- language and cultural barriers by enhancing the staff exchange under the EU mobility programmes;
- facilitation for VISA issues for both parties, the EU and Kazakh researchers;
- enhancing of participation of SMEs (public and private) in national and international programmes providing them with necessary co-funding

To bring the Kazakh scientific community closer into the EU Framework programmes, the first needs are:

- to support politically and financially the EU FP NCP structure within the country;
- the EC will take care to involve into INCO projects and networks first of all formally appointed NCPs and provide them with necessary funding to participate in the FP7/FP8 trainings and events conducted in the EU/AC countries;
- conclusion of a special S&T cooperation agreement between the EU and Kazakhstan to facilitate the participation of Kazakh researchers in the EU FP' calls and events;
- NCPs should play a significant role in bi- and multilateral S&T cooperation agreements as well;
- NCPs should be involved in the development of STI indicators in the country along with the State Statistic Agency;
- NCPs play a significant role in the increasing participation of the Kazakh scientific community in the EU FP7/FP8 through their daily work such as organisation of trainings and awareness activities for their local clients. This activity needs special funding, which should be spent from the governmental budget;
- there is need to plan the opening of a Kazakh R&D office in Brussels.

The Government of Kazakhstan should strictly follow the items of the national laws and orders on RTDI in Kazakhstan to provide the Kazakh scientific community with all necessities to escape brain drain from research and to make R&D activity more attractive for the young generation.

It is very advisable to open the Kazakh FP7 NCP structure under the Ministry of Industry and New Technologies taking into account similarities of the priorities and tasks of the EU FP7 and the Ministry.

I.6 Country Report Kyrgyzstan

Current State of S&T and Major Policy Challenges

In the Kyrgyz Republic, Science and Technology has been one of the core sectors of the Republic's economy before the collapse of the USSR. The current structure of the S&T institutions represents a network of scientific and education institutions distributed among the National Academy of Science, universities, and state-owned enterprises.

Presently the S&T system in Kyrgyzstan can be characterised as a combination of a centrally organised administrative system and a few elements that have appeared on the way of the transition to a market economy. Policy-making related to reforms in science, technology, and innovation in Kyrgyzstan failed to keep pace with other areas of social, political, and economic developments during last decades of the transition period.

In Kyrgyzstan, the level of research funding is currently at about 0.2 percent of the GDP (including 0.07% allocated to the National Academy of Sciences). This level of funding for science in the country can only be spent on the scientists' and researchers' salaries, rather than creating new knowledge and development needed to develop the country's market conditions.

S&T Indicators

TABLE 12: S&T LANDSCAPE 2010[109]

R&D Expenditure as % of GDP	Number of research organisations	Number of researchers
0.21	84	5,125

TABLE 13: EXPENDITURES ON R&D IN KYRGYZSTAN BY YEAR[110]

Year	R&D expenses (million Kyrgyz Som[111])	R&D expenses per capital
2006	268.3	0.0053
2007	351.7	0.007
2008	354.6	0.0071
2009	292.5	0.0059
2010	329	0.0066

Research Structure and Policy

There are two separate and independent structures in Kyrgyzstan: The Ministry of Science and Education (MSE), and the National Academy of Science (NAS KR), which actually acts as a Ministry itself and coordinates the branched and university science as well as academic institutes. Out of this, an Agrarian Science emerged, which is similar to NAS, but exists separately and is directly financed by the Ministry of Finance. It does not, and is not required to report to any other institutions stated above. All of this shows the non-existence of a united, centralised state body, to coordinate all of the country's scientific spheres, holding one and the same scientific and technical policy for all areas; thus, we see more serious and negative results from this system, rather than positive ones, even on state level.

The scientific potential of the republic consists of about 5,000 research, science and pedagogical and research and technical experts, including more than 600 doctors and 3,000 candidates of sciences.

Kyrgyzstan is on the threshold of entry into the industrially innovative phase of economic development. This stage is characterised by the adaptation of science to new economic conditions that should lead to major changes in structural, organisational, human resources, infrastructure, and financial support of this sphere.

The legal basis for national S&T policy: Recently, preconditions have been created upon which certain conditions will become the basis of the country's innovative development. Thus, with the purpose of developing and implementing a new public policy in the sphere of science focused on managing for practical results in priority directions of the national economy, and the about-turn of innovations development of the Law of the Kyrgyz Republic "On Science and Innovative Activity" was prepared and agreed with the ministries and agencies in 2009.

The Kyrgyz Republic has the following laws and regulations related to S&T:

(I) Law on science and state policy on science and technology, 2008;
(II) Law on innovative activity, 1999;
(III) Regulation on financing of scientific, technical and innovative activities, 1999;

Apart from this, the Kyrgyz Republic proposes within the Country Development Strategy following laws and regulations to foster the development of S&T:

(IV) the draft "National Nanotechnology Development Programme in the Kyrgyz Republic for 2008-2010";
(V) the registration of innovations of research institutions of the Kyrgyz Republic;
(VI) the draft "Regulations about the National Science and Innovations Fund" was developed, which will allow to accumulate funds allocated for research and innovations, to raise efficiency of their distribution, and to promote use of the innovation development venture financing with the purpose of supporting local scientists engaged in the given sphere;
(VII) the draft "Regulations on the Order of Financing Scientific Research and Technical and Innovative Activity" was developed with funds from the state budget;
(VIII) the draft "Resolution of the Government of the Kyrgyz Republic on Establishment of the Kyrgyz Technopark", an industrial park, was initiated to stimulate consolidation of financial and technical resources and the testing of innovations.

S&T priorities of the Kyrgyz Republic: Science and innovations have become a productive force of the domestic economy, and priorities of research and innovative activities are linked directly with priorities of social and economic development of the country on the stipulation that the share of applied research and experimental development activities is aimed at the introduction of modern energy and resource-saving technologies will increase to provide power and food safety.

Country Development Strategy for 2009 – 2011 was developed by the Government of the Kyrgyz Republic with the purpose of creating a comprehensive solution for social and economic tasks, and with regard to the vital importance of the Country Development Strategy (2009 – 2011) approved by the National Council for the strategic development of the Kyrgyz Republic. The Country Development Strategy covers a variety of socio-economic development aspects of the country, and particular attention is paid to the development of science and innovation, and the following fields of S&T are important for the development of the country:

- Information and communication technologies;
- Food security;
- Environmental protection;
- Energy and water technologies;
- Biotechnologies;

Important research organisations

The National Academy of Sciences of the Kyrgyz Republic carries out research in natural, engineering, and social sciences, to train scientists in all fields of knowledge, to advise the government on S&T policy, and to disseminate knowledge. The NAS defines the research topics in the national research institutions, coordinates basic research funded by the state, participates in international cooperation on S&T, and organises symposia and conferences to discuss science issues and to coordinate research. As of 2010,

[109] National Statistic Committee of the Kyrgyz Republic, 2010
[110] National Statistic Committee of the Kyrgyz Republic, 2010
[111] 1 Kyrgyz Som = 0,016 Euro (as of October 2011)

there are 22 research institutes with 37 academicians, 57 corresponding members, and 7 foreign members. The most acute problem of the NAS KR is a very low level of research funding and the remuneration of scientists. Today, funding of academic science is 0.07% of the GDP. Virtually there is no funding for articles of budget, which covers expenses related to field expeditions, travel expenses to attend international scientific conferences, purchase of scientific instruments and reagents, the publication of books, magazines, and others. A lack of economic incentives in connection with the egalitarian principle of payment reduces the efficiency.

There are 19 Kyrgyz universities which conduct different types of research, such as information and telecommunication technologies, electronics and problems of applied mathematics, parallel computing technologies, modern technologies of mining operations, agricultural techniques as well as bio-diversity and environment.

There are several spin-offs at different departments of the NAS which continue successful operations by an innovative self-financing structure, like IC "Shakirt", SIC "Geopribor", SPC "Geoservice", etc.

Current Trends & Challenges in International Cooperation

National Policies

The Kyrgyz Republic Law on "Science and Basics of State Policy on Science and Technology" from 2008 supports activities related to S&T, like conducting joint researches, creation of joint research centres and organisations, and holding scientific conferences and symposia;

Bilateral Agreements

- The Kyrgyz Republic signed 13 government agreements with countries like Russia, Mongolia, the UK, Kazakhstan, Armenia, Georgia, Turkey, Uzbekistan, China, etc.
- There are about 94 agreements at the institute level with organisations like the NATO, the NCCR, the DAAD, the Academies of Sciences of countries like Switzerland, Germany, the USA, China, Russia, etc.

Regional Network/Cooperation

The Kyrgyz Republic has close science and technical collaboration relations with neighbouring countries, like Kazakhstan, Uzbekistan, Tajikistan, and China. Moreover, Kyrgyzstan cooperates with Kazakhstan, Tajikistan, Russia, Armenia, Belarus, and Georgia within the international programme ISTC and the University of Central Asia operates in 3 countries of Central Asia: Kazakhstan-Kyrgyzstan and Tajikistan. Therefore, possibilities for joint research in the mountainous regions of these three countries are offered.

EU – Central Asia Strategy

The EU – Central Asia Strategy focuses on investing into the future: youth and education, and promoting economic development, trade, and investment. Under the first initiative, the EU supports the cooperation in higher education, the academic and student exchanges, for instance under the new Erasmus Mundus facility and TEMPUS, and bilaterally. The economic development initiative supports economic diversification with a view to promoting sustainable development by improving local skills and potential (science and technology, innovation, and tourism), the promotion of SMEs and the development of basic infrastructure (road, rail, telecom, IT);

Partnership and Cooperation Agreements (PCAs)

The Kyrgyz Republic and the EU signed a Partnership and Cooperation Agreement in 1995, and particularly Article 51 of this PCA covers S&T cooperation of both parties by promoting the exchange of scientific and technical information; joint RTD activities, training activities, and mobility programmes for researchers.

National and Bilateral Programmes

- Agreement between the Government of KR and the International Science and Technology Centre on terms of operation in the Kyrgyz Republic (2000);
- Cooperative agreement between the Government of KR and the German GeoForschungsZentrum, Potsdam/ Germany on establishing a Central Asian Institute for Applied Geosciences (2002);
- Memorandum of Understanding with the Swiss National Centre of Competence in Research North-South (NCCR Programme) (2003);
- A Memorandum of Mutual Understanding with the World Innovation Foundation for a joint establishment of an international public research centre (incubator) in the Kyrgyz Republic (2005);
- Protocol of intentions with the project "Virtual Silk Way" under the NATO science programme "Security Through Science" and the association "Kyrgyz Scientific and Educational Computer Network" (2005);
- Cooperative agreement with the Russian Foundation for Fundamental Research (2007);
- Concept of State Innovation Policy in 2003-2005; beginning: 2003; ending: 2005

EU Framework Programme for Research and Technological Development

- The National Library of the Kyrgyz Republic is operating as a National Contact Point for FP7 in Kyrgyzstan, covering general coordination of the activities and currently the NCP is planning to appoint certain institutes to act as an NCP in respected fields of research.
- Until now, there have been 7 projects and country-related participations in the FP7
- EC contribution to the Kyrgyz Republic's participation in the FP accounts for 145.5 thousand euros

Development Cooperation Instrument (DCI)

DCI covered a variety of socio-economic activities in the Kyrgyz Republic within the national and regional projects within the Central Asia Regional Strategy and the Indicative Programme 2007 - 2010. One of the tasks of this programme is the promotion of educational exchanges, scientific and people-to-people activities.

The indicative budget both for regional and bilateral allocations is €719 million. It is broken down as follows:

- Regional component: 30–35%
- National component: 65–70%

Lifelong Learning Programme (LLP)

Kyrgyzstan participates in the TEMPUS and the ERASMUS MUNDUS Programmes of the EU. There were 7 projects under the TEMPUS IV Programme, and Kyrgyzstan confirmed its intention to adopt the principles of the Bologna Process, as promoted and tested through TEMPUS. Over three years, 2007 – 2009, 17 partner universities have been involved in the Erasmus Mundus Programme. Under this programme about 130 scholarships have been granted to Kyrgyz students and academics.

Challenges

There are significant gaps in Kyrgyzstan between the economic development needs and the own technological support potential. All key industries of the Kyrgyz economy depend on other countries' technology. In agriculture of the country they use an elite seed variety, pedigree cattle, agro technologies, and equipment which are designed and made in other countries. The country has lost in part achievements of previous generations on cultivation of own highly productive pedigree cattle and regionalised elite seed variety of basic agricultural crops. The current condition of scientific and technical potential prevents from achieving key successes at their reproduction and improvement. In another critical industry for the country – the energy sector – all manufacturing equipment is imported from abroad. The lack of own innovations and the sustained technological dependence of Kyrgyzstan leads not only to a weakening of competitive ability in economy, but also puts an insuperable barrier to the achievement of higher social and economic development indicators.

The existing level of the development of science and scientific achievements of Kyrgyzstan does not satisfy the social and economic development needs of Kyrgyzstan. Over the years of independence, the country has lost in part the scientific potential accumulated in the past. Despite the small quantitative growth in the number of workers engaged in research and development activities, results of research activities are of modest scientific value, do not meet the best world achievements, and do not find practical application in the national economy. The research staff is slowly replenished by young scientists that results in a loss of continuity. Mean age of experts carrying out research and development activities in 2006 was 46.6 years, candidates of sciences – 50.5 years, and PhDs – 58.1 years. At present the society does not consider science as the major factor of the economic development and research activity is not considered as prestigious to be worthy of high material support. Accordingly, the research activity incentive system is not developed.

The organisational structure of science lacks the decision-making system in use of resources and potential of the private sector. The fact that research and development programmes are financed from the republican budget and are headed by a number of managers, complicates the coordination of research activities carried out in the country.

Structural disproportions in organisation of research activities led practically to a lack of demand for their results. One of the characteristic features of today's scientific and innovative activity is that the specific weight of fundamental research receiving 47% of funds is allocated for science (exceeding twice the

world level) whereas slightly more than 17% is allocated to applied research, and only 3% to experimental development activities. The specific weight of funds directed to financing of the development in engineering sciences does not exceed 19% notwithstanding the fact that namely here so needed power- and resource-saving issues as well as of alternative energy sources are solved. Therefore, science is not able to respond to threats of energy and food crises faced by the country.

Conditions for reproduction of science manpower resources were complicated in connection with leaving of highly qualified scientists for other spheres of economic activities. Thus, the number of employees engaged in scientific and innovative research and development in Kyrgyzstan, as compared with 1991, decreased more than twice. There is an outflow of the scientific personnel abroad and a lacking inflow of new young specialists in the domestic science, which lead to a break of continuity.

Participation of higher education in research activities is decreasing, which is a consequence of its reorientation mainly to educational functions due to bias towards commercialisation. Thus, negative tendencies in training of scientific personnel, such as an increase in the proportion of dissertations of applicants who are not working entirely in scholarship, a lack of motivation of scientific workers to continue professional development after obtaining a degree without proportional material security, etc.

The number of publications and patents from domestic scientists is decreasing. The available innovative potential does not conform to production needs, thus leading to communication gaps between science and industries. In the sector an incorrect financing approach is used – the budget financing of scientific research in strict conformity with protected items of the budget economic classification focuses on scientific institutions and resources, but not on results. Since the laboratory and instrument base is morally and physically obsolete, this circumstances do not allow conducting research and development satisfying consumers' demands.

The analysis of the scientific and innovative activity status in Kyrgyzstan shows that this sphere does not serve as a guarantee for a sustainable economic development. Moreover, science appeared to be excluded from the economic reform process that prevented from laying the "scientific groundwork" urgently needed for the activation of economic and social progress factors.

There is no mechanism of attracting private business for the development of scientific potential. That explains businessmen's low activity in the R&D sphere although development and introduction of high technology production and innovative technologies in manufacture are key factors for the achievement of competitive advantages.

All of the above shows clearly the urgent need for a radical reform in the sphere of science in Kyrgyzstan.

I.7 Country Report Moldova

Current State of S&T and Major Policy Challenges

TABLE 14: S&T LANDSCAPE 2010

R&D Expenditure as % of GDP	Number of research organisations	Number of researchers
0.42	38	4,764[112]

Research Structure and Policy

The main legal acts which regulate the activity in the field of S&T in the Republic of Moldova are the ***Code of the Republic of Moldova on Science and Innovation,*** adopted on 15 July 2004, and the ***Partnership Agreement between the Government and the Academy of Sciences of Moldova*** (ASM), presently for the period of 2009-2012, which authorises the ASM with the Government's competence in the field of scientific research.

The basic goal of the state policy in the field of science and innovations is a stable socio-economic and human development in the Republic of Moldova, based on a maximum stimulation and the use of scientific, scientific-technical and technological potential, oriented to the creation and commercialisation of competitive and ecologically pure products, services, and processes.

The strategic priorities in the field of science and innovation consist of:

- strengthening the State of Law and use of cultural heritage with the perspective of European integration;
- efficient use of human, natural, and information resources for sustainable development;
- biomedicine, pharmaceutics, and human health;
- agricultural biotechnology, soil fertility, and food security;
- nanotechnology, industrial engineering, new materials and products;
- efficient growth of the energetic complex, assurance of energetic security, including the use of renewable resources.

Important Research Organisations

The Academy of Sciences coordinates the scientific and innovation activities, and is the supreme scientific forum and scientific adviser to the public authorities.

Within the Academy of Sciences of Moldova 3 scientific divisions and 2 subdivisions are activated:

- Division of natural and life sciences, with 2 subdivisions: on medical sciences and agricultural sciences;
- Division of exact and economic sciences;
- Division of social sciences and humanities.

On 1 January 2011, 38 institutions in the field of research and innovation, including 21 institutions of the Academy of Sciences of Moldova, 15 accredited universities, and 2 affiliated organisations were registered. The total number of employed persons was 4,764, including 3,190 researchers, 1,054 researchers with PhD degree and 310 professors.

The economic-financial crisis caused a decrease in financial allocations in the field of science and innovation from 0.7% of the GDP in 2008 to 0.42% of the GDP in 2010.

The main universities which act in the field of S&I are as follows:

- the Moldova State University[113]
- the Academy of Economic Studies of Moldova[114]
- the State University of Medicine and Pharmaceutics "Nicolae Testemitanu"[115]
- the Technical University of Moldova[116]
- the State Agricultural University of Moldova[117].

The institutions' evaluation and the scientists' attestation is the competence of the ***National Council for Attestation and Accreditation***. The accreditation system of institutions from the fields of science and innovation will give them the possibility to obtain financial support from the State Budget.

The State Agency on Intellectual Property (AGEPI) deals with intellectual property rights. It was established on the basis of the Code of Science and Innovation and it represents the Republic of Moldova at the World Intellectual Property Organization and other international and interstate organisations on intellectual property protection. AGEPI supports and develops relations of cooperation with them as well as with profile establishments of other states.

The Agency for Innovation and Technology Transfer (AITT) is authorised with functions on implementing innovation and technology transfer strategies and policies, and promotes the development of the innovation infrastructure in the country.

In order to develop S&T activities, the private sector may use the innovation infrastructure components: Scientific and Technological Parks "Academica", "InAgro", "Micronanoteh" and the Innovation Incubator "Inovatorul", which are managed and supervised by AITT. At the present moment, about 50 companies perform their activities in the above mentioned structures.

Current Trends & Challenges in International Cooperation

National Policies

According to the Article 160 of the Code of the Republic of Moldova on Science and Innovation, the state supports the extension of cooperation with foreign partners in the fields of science and innovation, creates favourable conditions for integration in the international scientific-technical community in accordance with the legislation in force. In order to foster international cooperation and the integration in ERA, the "Moldova Knowledge Excellence Initiative" Action Plan was adopted in 2008 by the Supreme Council for Science and Technological Development of ASM.

Bilateral Agreements

According to the Code on Science and Innovation, ASM has the prerogative to conclude science and technology agreements on behalf of the Government. ASM signed over 40 bilateral scientific agreements and collaborates on their basis with various research institutions.

Regional Network/Cooperation

Moldova participates in international programmes, especially in FP7 with the following EU countries: Greece, Romania, Bulgaria, France, Italy, Great Britain, Germany, and Austria. In 1992, Moldova became a member of the Joint Institute for Nuclear Research (JINR) in Dubna.

EU – European Neighbourhood Policy

A joint ENP Action Plan was adopted in February 2005 by the EU-Moldova Cooperation Council. The EU-Moldova ENP Action Plan stipulates the following priorities concerning research, development and innovation activities: preparing Moldova's integration into the European Research Area and into the Community R&D Framework Programmes on the basis of scientific excellence, developing Moldova's capacity in technological R&D to support the economy and society, supporting Moldova's integration in high-level scientific exchanges. Due to joint efforts of the Academy of Sciences and the Moldovan Government and with the support of the European Commission, the Republic of Moldova will become an Associated Country to the Seventh Framework Programme starting in January 2012.

Partnership and Cooperation Agreements (PCAs)

The Partnership & Cooperation Agreement (PCA) is the legal basis for EU relations with Moldova. The PCA came into force in July 1998 for an initial period of ten years. It established the institutional framework for bilateral relations, set the principal common

[112] The Court of Accounts of Moldova Report. Published: 13.05.2011 in Monitorul Official Nr. 78-81 www.lex.justice.md/viewdoc.php?action=view&view=doc&id=338497&lang=1
[113] www.usm.md
[114] www.ase.md
[115] www.usmf.md
[116] www.utm.md
[117] www.uasm.md/u

objectives, and called for activities and dialogue in a number of policy areas.

National and Bilateral Programmes

Bilateral programmes:

- Collaborative Call between the German Federal Ministry of Education and Research (BMBF) and the Academy of Sciences of Moldova (ASM); Start date: 14.03.2008
- S&T Cooperation Programme between the National Authority for Scientific Research of Romania (ANCS) and the Academy of Sciences of Moldova (ASM) for the years 2010-2012; Start date: 07.11.2009
- Collaborative Call between the BRFFR (Belarusian Republican Foundation for the Fundamental Research) and the Academy of Sciences of Moldova (ASM); Start date: 03.05.2007
- Collaborative Call between the Academy of Sciences of Moldova (ASM) and the Russian Foundation for Basic Research (RFBR); Start date: 2006
- Collaborative Call between the Academy of Sciences of Moldova (ASM) and the Russian Foundation for the Humanities (RFH); Start date: 01.07.2009
- Collaborative Call between the Academy of Sciences of Moldova (ASM) and the Ministry of Education and Science of Ukraine (MESU); Start date: 02.12.2008
- STCU (Science and Technology Centre in Ukraine) and ASM – Common Research-Development Initiatives
- Collaborative Call between the Academy of Sciences of Moldova (ASM) and the National Research Council of Italy (CNR); Start date: 23.06.2010
- Collaborative Call between the Academy of Sciences of Moldova (ASM) and National Centre for Scientific Research of France (CNRS); Start date: 01.01.2012

EU Framework Programme for Research and Technological Development

As a result of a contest among young researchers announced in 2008 by the Supreme Council for Science and Technological Development of the Academy of Sciences of Moldova, six young researchers were nominated as National Contact Points for cooperation and financial NCP. Besides these, an NCP for mobility was nominated within the Centre for International Projects of the ASM and an SME NCP – within the Agency for Innovation and Technology Transfer of the ASM. In the process of creation are Regional Information Points. The activity of this network is coordinated by the Centre for International Projects, within ASM.

Since the 7th Framework Programme was launched, more than 120 proposals with the participation of Moldovan research groups (including research institutions, higher education institutions, SMEs and NGOs) were submitted and 16 were accepted for funding. The contribution of the European Commission for Moldova's participation is about 1.600.000 euros.

European Neighbourhood Policy Instrument (ENPI)

A Country Strategy Paper for Moldova was elaborated by the European Commission for 2007-2013. The CSP lists the objectives of EU/EC cooperation with Moldova and outlines the Moldovan policy agenda, as well as the country's political, economic, social, and environmental situation. Assistance provided under the national ENPI envelope for Moldova will focus on three priority areas: ***Support for Democratic Development and Good Governance, Support for Regulatory Reform and Administrative Capacity Building, Support for Poverty Reduction and Economic Growth.*** S&T is not among the main priorities. Under the National Indicative Programme 2011-2013, Moldova will receive €273.14 million from the ENPI.

Lifelong Learning Programme (LLP)

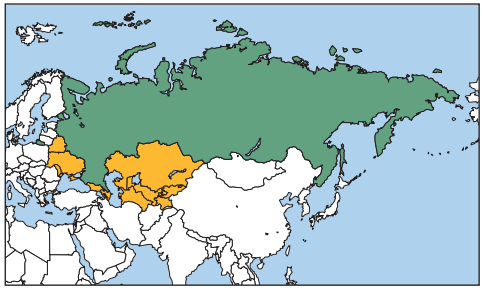
In 1994, the Republic of Moldova joined the Tempus programme. Its initial focus was on university management, curriculum development, and teaching staff retraining in the fields of social work, communication studies, modern European languages, and economics. Since 2000, Moldovan non-academic actors – in particular government organisations, and to a minor extent, enterprises – have gradually become more active in Tempus projects. For the period of 2009-2011, 8 projects with Moldovan partners were selected for funding.

Moldova joined the Erasmus-Mundus Programme in 2004. Higher education institutions from Moldova have been actively participating in the Erasmus-Mundus External Cooperation Window since 2007. In 2010, the Moldova State University became the first Moldovan university to be selected as a full partner in an Erasmus Mundus Action 1 project, delivering a masters course on migration with EU partner universities. Student and academic mobility was further enhanced under Action 2 with the expected award of 66 grants.

Challenges

One of the main challenges is to identify the proper role of S&T in tackling societal needs and strengthening the competitiveness of the national economy. Recognition of science as a national priority should find an expression within the national strategy papers. Reducing the public funds allocated to R&D will diminish the positive trend registered after 2004 and will have a negative influence on upgrading the scientific infrastructure. The connection between science and business should be fostered, new mechanisms for attracting private investments in R&D need to be launched. Science is still not an attractive area for the younger generation. More than this, due to a wage disparity between Moldova and main EU partner countries, the emigration of young scientist will not diminish in the short and medium term. Following the association of Moldova to the Seventh Framework Programme, the status of an associated country should be properly explored: increasing the rate of participation, raising visibility within ERA, participating in the programme committees, reintegrating grants for the diaspora, etc.

I.8 Country Report Russia



Current State of S&T and Major Policy Challenges

S&T Indicators

TABLE 15: S&T LANDSCAPE 2010[118]

R&D Expenditure as % of GDP 2009	Number of research organisations 2009	Number of researchers 2009
1.24	3,536	369,200

Research Structure and Policy

The legal basis for national S&T policy is the Federal Law №127 "On Science and State S&T Policy" of 1996[119], which was amended more than a dozen times in 1998-2009. The law regulates relations among various actors of S&T sphere, state authorities and consumers of S&T outcomes. It defines the scientific activity as an activity which is aimed at obtaining and applying new knowledge. The law also sets the legal status of the S&T personnel and S&T organisations, as well as the typology of the latter. Most significant is that the law sets the status of the Russian Academy of Sciences.

The law "On Protection of Competition" passed by the Federal Assembly of the Russian Federation in late 2005[120] plays an important role in the competitive distribution of the biggest part of S&T government funding to all kinds of recipients.

As of 2006, the Russian research and education policy was supported with a number of important laws and the launch of the National Priority Project "Education" (PNPO)[121], which was overseen by the Russian President Dmitry Medvedev in his former position as Vice Prime Minister. The main S&T related laws and documents passed in 2006 were as follows:

- The federal law on the introduction of a Unified State Examination at the end of secondary education;
- Amendments to the federal law "On science and state policy in science and technology";
- The federal law "On autonomous institutions", which allows to establish a new kind of government-"autonomous" institutions;
- Section 4 of the Civil Code on the "protection of intellectual property".

The evolution of S&T and innovation legislation continued thereafter. The federal law "On introducing changes to selected legislative acts of the RF for creating favourable fiscal conditions for financial support to innovation activity"[122] came into force on 1 January 2008. In addition, a federal law concerning the development of SMEs was adopted.

The federal law #217 from 24 July 2009 allowed state educational and scientific organisations to found commercial entities for the commercialisation of their intellectual activity results. Among other important features of the Russian legislation on S&T and innovation is the transition towards performance-based budgeting and performance evaluation. This transition is based on decrees of the Ministry of Education and Science on individual performance-based bonuses and on measuring the performance of R&D institutes. The implementation of these reforms progresses slowly.

The regular research-based identification of national S&T priorities started at the federal level in the middle of the 1990s. National S&T priorities are formulated in two lists – priority S&T areas and critical technologies[123]. A regular revision of critical technologies takes place every 3-4 years. In 2000-2001, new lists of nine S&T priority areas and 52 critical technologies were identified. The main changes consisted in the optimisation of the number of priority areas and in concentrating resources in the most important fields of innovation.

In 2002, the Russian President approved the ***"Basic directions of the Russian Federation's policy in S&T development"***[124] for the period 2010 and onwards. This document has become an important element of Russia's social and economic development strategy, aimed at promoting innovation-based economic development, creating an efficient national innovation system, and making S&T one of Russia's key priorities.

The most recent update of country priorities was made by the President's decree of 7 July 2011[125]. The list of priority directions, supported with a more detailed list of 27 critical technologies[126], covers the following areas:

1. Security and counterterrorism;
2. Nanosystems and materials industry;
3. Information and telecommunication systems;
4. Life sciences;
5. Advanced weapons, military and special equipment;
6. Rational nature use;
7. Transport and space systems;
8. Energy efficiency, energy saving, and nuclear energy.

Moreover, in his address to the Federal Assembly on 12 November 2009, President Medvedev named the 5 priorities for modernisation of the Russian economy and Russia's technological development: introduction of advanced medicine, nuclear energy, information technology, development of space and telecommunication systems, and the dramatic increase of energy efficiency. The presidential Commission on Modernisation and Technological Development of Russia's Economy approved a list of projects in all five priority areas with detailed action plans, which are being implemented[127].

Among the recent policy activities is the recurrent and open revision process of Russia's S&T priorities, the Government's decree on the performance assessment of R&D organisations, the launch of a federal funding programme "Scientific and scientific-pedagogical personnel of innovative Russia" (approx. €2.3 billion until 2013).

A federal programme targeting the creation of a network of technoparks was initiated in 2006 and has been broadened in recent years[128].

Important Research Organisations

Russian Academy of Sciences

The Russian Academy of Sciences (RAS) has been and is still today the most important Russian research organisation. It absorbs around a third of the Russian civilian R&D budget or more than RUB 50 billion (€1.4 billion) per year[129]. The Russian Academy of Science (including its Ural, Siberian and Far Eastern branches) was the recipient of 61.5% of state funds for basic research in 2009 and 64.2% in 2010. In comparison, the Russian Foundation for Basic Research received 8.9% and 7.8%, respectively, and the Russian Foundation for Humanities only 1.5 and 1.3%, respectively[130].

RAS is a civil self-governed non-commercial institution, including scientific, science support, and social organisations. Its structure comprises discipline and

[118] Source: Russian Federal State Statistics Service (www.gks.ru/bgd/regl/b11_11/Main.htm)
[119] Federal Law "On Science and State S&T Policy" of 23 August 1996 # 127-FZ.
[120] Federal Law of the Russian Federation "On Protection of Competition" of 26 July 2006 # 135-FZ
[121] Information about the project is accessible at the website of the Ministry of Education and Science www.mon.gov.ru/pro/pnpo/
[122] Federal law #195-FZ of 19 July 2007
[123] Priority S&T areas are areas with a potential to make a major contribution towards providing the country with more security, faster economic growth, greater competitive capacity of Russian companies through the development of the technological foundations of the national economy and R&D-intensive production facilities.Critical technologies are considered as sets of technological solutions that create potential for further development of various technological areas, and which offer a broad range of innovative applications in various sectors of the economy .
[124] Letter of the Russian President of 30 March 2002 # Пр-576. www.tomskforum.ru/export/sites/ru.tomskforum/ru/docs/federal/foundations-science-and-technology-policy-2010.pdf
[125] www.news.kremlin.ru/news/11861
[126] www.news.kremlin.ru/ref_notes/988
[127] www.kremlin.ru/transcripts/5979
[128] OECD (2011), OECD Reviews of Innovation Policy: Russian Federation 2011, OECD Publishing
[129] Data for 2007. Science Indicators: 2009. Statistical Databook. Higher School of Economics, Moscow.
[130] Data for 2008. Science Indicators: 2010. Statistical Databook. Higher School of Economics, Moscow.

branch-specific divisions, regional RAS divisions and regional RAS scientific research centres (Figure 1). The principal objective of the regional branches consists in organising and implementing scientific research, as well as promoting the most appropriate development for the region and the Russian Federation as a whole. They include scientific centres, institutes, other scientific organisations, science support and social organisations.

FIGURE 1: STRUCTURE OF THE RUSSIAN ACADEMY OF SCIENCES

More than one third of unique scientific installations belong to the institutions of the public academies of science[131]. The Russian Academy of Sciences and the other public academies of sciences have drawn up their own list of unique facilities. The list includes 26 infrastructures.

Kurtschatow-Institute, Research Centres, (from ERA.Net RUS D.1.1.1. – the Russian S&T System)

The National Research Centre (NRC) "Kurchatovsky institute" was created as a pilot project on 28 April 2008 according to the decree issued by the President of the Russian Federation, V.V. Vladimir Putin[132]. It concentrates on the following:

- boosting the commercialisation of research results, and carrying out complete and innovative research and development activities, including the creation of industrial samples, in priority areas for the development of science, technologies, and techniques in the Russian Federation, such as: "Industry of nanosystems and materials" and "Power engineering and power savings"
- coordinating scientific activities for the implementation of the Presidential initiative "Strategy for the development of nanoindustry"
- developing principles for the construction and functioning of national research centres.

In addition to its primary activities, the NRC "Kurchatov institute" will participate, on behalf of the President of the Russian Federation and of the Government, in the implementation of large-scale international projects in the area of creating and implementing research infrastructure.

In the pilot project for the creation of the NRC, besides the Russian Research Centre "Kurchatov Institute", RRC KI (Moscow), a few other leading Russian research institutions are taking part, such as the Konstantinov Institute of Nuclear Science, PNPI (Gatchina near St. Petersburg), the High-Energy Physics Institute, IHEP (Protvino, Moscow region) and the Institute of Theoretical and Experimental Physics, ITEP (Moscow). Those centres are the leading Russian centres in the field of nuclear physics and they have various large and unique research facilities.

In order to ensure favourable conditions for the successful implementation of the project, the Russian Research Centre "Kurchatov Institute" comes under the direct responsibility of the Government of the Russian Federation by the order of the Government of the Russian Federation from 14 December 2009[133].

Russia disposes of a range of major research infrastructures, especially in physics. As a leading scientific power in nuclear energy, military technologies, and in aeronautic and space research, respective research infrastructures have been built. Some of the main installations are located at the Kurchatov Institute in Moscow (synchrotron centre, neutron reactor, beam technology).

The infrastructural side of innovation in Russia is implemented through three main instruments: Special Economic Zones, Technology Parks, and Science Cities.

Special Economic Zones (SEZ) are government-defined territories within the Russian Federation, which are subject to special enterprise laws[134]. The Law on Special Economic Zones took effect on 1 January 2006. According to the Law, SEZs have to comply with one of the following three types: industrial-productive, technological-innovative, or tourist-recreational zone. This law stipulates significant tax and customs benefits for SEZ businesses and residents; for example, Unified Social Tax is reduced from 26 percent to 14 percent in technological-innovative SEZs. Residents of industrial-productive SEZs are exempted from land tax and income tax for five years. In addition, all imported technical equipment and materials are exempted from customs duties.

The concept of a "Technology Park" encompasses the entire development and production chain of a product right up to the marketed item: idea > development > prototype > production planning > production > market introduction > sales. Technology Parks are environments used for piloting new financing models for the promotion of technological innovation and the use of risk capital. Small and Medium-sized Enterprises (SMEs) are the primary target group of Russia's Technology Parks.

In the former Soviet Union, Science Cities (naukogrady) were created as part of closed-off, large-scale military and industrial complexes ('closed cities'). They subsisted entirely on public funding. This system has been reformed in recent years. The title naukograd is conferred by the Government of the Russian Federation. Science Cities dispose of highly qualified personnel, of science, infrastructure, and development concepts, as well as a range of special subsidies. The funding of Science Cities is ensured by the federal budget, the budget of subjects of the Russian Federation (e.g. regions), and others sources of funding. Material and technical infrastructures can also be financed by the local budget. At the beginning of 2010, President Medvedev made a new step for stimulating innovation technologies in Russia. He launched the initiative of a "Russian Silicon Valley", that is a high-tech city for young, creative scientists and entrepreneurs to be built from scratch in the Moscow region town of Skolkovo, presently hosting only a business school. The new town will follow five presidential priorities for modernisation: energy, IT, telecommunications, biotechnology, and nuclear technology. The project, which would cost up to 4 billion USD, will be funded from the Government's modernisation and innovation budget. It will have to overcome the difficulties of creating innovation centres under "hothouses conditions", for example in the form of SEZ, which have proved to be largely unsuccessful[135].

Universities

One of the noticeable recent trends in the Russian S&T policy is the redistribution of state funding in favour of universities (including the creation of federal universities and national research universities, etc.). Clearly, reinforced research universities, working in closer synergy with the best public research institutes as well as a new generation of firms, managers, and entrepreneurs can be powerful additional drivers of innovation[136].

Seven federal universities were created in 2007-2009 in all federal districts. First the two pilot universities were formed in Southern and Siberian federal districts on the basis of acting universities. Each of these obtained approx. RUB 6 bn. (approx. €150 m at current exchange rate) for their development programmes in 2007-2009. On 21 October 2009, the Presidential decree established 5 more universities in the remaining federal districts.

In 2009-2010, the Russian Government had also established National Research Universities in order to increase synergies between research and higher education, and to create centres of excellence across the Russian territory. After a competitive examination, 12 National Research Universities have been selected for

[131] RAS, Russian Academy of Medical Sciences, Russian Academy of Education, Russian Academy of Arts, Russian Academy of Architecture and Construction Sciences
[132] www.kiae.ru/index34.html
[133] www.kiae.ru/index37.html
[134] Federal Law of the Russian Federation, 22 July 2005 116-FS "On Special Economic Zones of the Russian Federation".
[135] Quarterly Report of the EU Delegation to Russia, Moscow, January- March 2010.
[136] OECD (2011), OECD Reviews of Innovation Policy: Russian Federation 2011, OECD Publishing.

a period of 10 years, and in 2010, 15 more Universities have been approved, bringing the total number to 29. They will each receive an amount of RUB 1.8 billion (approx. €45 million at current exchange rate) every year over a period of 5 years.

Private Sector

The innovation activity of Russian firms remains rather low and a share of innovators is around 9-10%[137]. Moreover business contributes little to the national expenditure on R&D. In Russia the business enterprise expenditure for R&D (BERD) fluctuates around 30% (28.7% in 2008)[138]. Production enterprises perform relatively little in-house R&D. The mostly publicly owned former branch institutes and design bureaus, separated organisationally from production enterprises, perform more than 80% of business enterprise R&D, half of which operate in the defence sector.

The core enterprises of the Russian Federation's corporate sector bare some legacy of the Soviet system, the subsequent privatisations, economic downturns, restructuring and transitions. The corporate governance system in modern Russia is characterised by some form of control the state has in many Russian enterprises, especially in the extractive industry. State-owned enterprises are found in various sectors. They often are a monopoly in the respective industry and in many instances incorporating research organisations.

The Russian private sector innovators face a number of challenges, including the lack of external financing for high-risk innovation. Since 1994, a dedicated public non-profit organisation, the Foundation for the Support to Small Innovative Enterprises (FASIE), with resources of up to 1.5% of the total civil R&D budget, provides a variety of support measures, ranging from direct financial support to start-ups to the provision of support services to small innovative enterprises.

The Russian Venture Company (RVC) was founded by the federal government in 2006 with a mission to stimulate the creation of a venture capital industry in Russia. RVC financially participates in the creation of regional venture funds (23 funds were created in 21 regions). By mid-2009, less than 50 companies benefited from both the national and regional funds, partly due to lack of good quality applications.

Moreover, a variety of technoparks, business centres, and business incubators are working across Russia, some of which have been successful in developing innovative businesses (e.g. Tomsk Innovation Technology Centre "Technopark").

Current Trends & Challenges in International Cooperation

National Policies

Favourable regulations for international S&T cooperation are stated in the Russian Federal law no 127 of 1996[139]. The "Strategy for the Development of Science and Innovation in the RF for the Period until 2015"[140] includes a short chapter on positioning the Russian research sector in a global context with an accent on cooperation with the EU. The federal targeted programme "Research and Development in Priority Fields of the Russian S&T System, 2007-2012" allows the participation of foreign scholars and entities.

Bilateral Agreements

Scientific ties between Europe and Russia have always been very tight. As a proof, Russia has 19 bilateral S&T cooperation agreements with the Member States and Associated Countries[141]. Multiple sectoral agreements exist between Russia and the EU, and between Russia and EU member states[142].

On 19 May 2011, at the 57th meeting of the Heads of State of the Commonwealth of Independent States, the draft Intergovernmental programme for cooperation of CIS states in the sphere of innovation until 2020 was adopted. The draft programme consists of 5 sub-programmes: intergovernmental cooperation in the sphere of innovation; development of S&T capacities; R&D personnel; joint use and development of innovation infrastructure as well as intergovernmental regulation of innovation activity. Each of these sub-programmes is formed as an inter-governmental targeted programme.

Information and data on the bilateral S&T cooperation programmes were gathered in the course of the FP7 ERA.Net RUS project by means of a survey[143]. From the survey and interview data analysis, it can be concluded that an impressive wealth of S&T cooperation exists at a bilateral as well as a multilateral level between Russia, on the one hand, and the EU Member States and Associated Countries to the FP7 (EU MS/AC) on the other hand. At the bilateral level, several countries stand out with a comprehensive cooperation with Russia. This concerns above all the big EU countries Germany and France. Several smaller countries also have a remarkable tradition of cooperation with Russia. For example, the Nordic countries Finland and Norway have substantial cooperation programmes in monetary terms. But also Austria, Greece, Italy, Israel, Poland, Switzerland, and the United Kingdom traditionally have a good and comprehensive S&T cooperation with Russia.

The RAS international cooperation policies target the study and analysis of international scientific achievements in order to use them in Russia and the development of international scientific cooperation. Collaboration with foreign partners is carried out through agreements for scientific cooperation with the academies of sciences and other research organisations, the establishment of national committees and international research centres within the Academy, and broad collaboration with international and foreign scientific organisations (RAS bilateral cooperation agreements are listed in Annex 1). Other activities include the representation of Russian scientists at international scientific unions, participation in international organisations, international scientific congresses, conferences, symposia and seminars, international exhibitions, etc.

Regional Network / Cooperation

Of the overall 29,912 publications of Russian authors in scientific journals indexed in the Web of Science 32.4% were made in co-authorship with foreign researchers (2008). The overall share of Russian researchers' publications in the total volume of publications indexed in the Web of Science decreased from 3.99% in 1995 to 2.48% in 2008. The main S&T partner countries 2004-2008 of Russia as per publication activity (co-authored papers) are USA, Germany, France, UK, Italy, Japan, Poland, Switzerland, The Netherlands, Sweden, Spain, Canada, China, and South Korea[144].

The Joint Institute for Nuclear Research (JINR)[145] is an international intergovernmental scientific research organisation established through the Convention signed on 26 March 1956 by eleven founding States and registered with the United Nations on 1 February 1957. It is situated in Dubna not far from Moscow in the Russian Federation. The main fields of JINR's activity are theoretical and experimental studies in elementary particle physics, nuclear physics, and condensed matter physics. There are 7 laboratories at JINR, by the scope of scientific activities each being compatible with a large research institution. JINR's staff totals about 5,000 people, including more than 1,200 scientists and 2000 engineers and technicians.

ISTC[146] – the International Scientific and Technological Centre – is an intergovernmental organisation specially designed to prevent Soviet military scientists from leaving the country and conducting military research abroad. It is dedicated to the non-proliferation of weapons and technologies of mass destruction. ISTC was established at the beginning of the 1990s by an agreement between the European Union, Japan, the Russian Federation, and the United States of America. Armenia, Belarus, Georgia, Kazakhstan, and the Kyrgyz Republic also have joined the ISTC. Norway acceded to the ISTC in 1997, the Republic of Korea in May 1998, and Tajikistan in March 2003. Canada became a full member of the ISTC in March 2004. The ISTC Secretariat Headquarters is located in Moscow. ISTC coordinates the efforts of

[137] Russian Federal Service of State Statistics, www.gks.ru/bgd/regl/b11_11/Main.htm
[138] Science Indicators: 2010. Statistical Databook. Higher School of Economics, Moscow
[139] According to Article 16 "International Scientific and S&T Co-operation of the Russian Federation" of the Federal Law № 127-FZ of 23 August 1996 "On Science and State S&T Policy", public authorities of the Russian Federation create the necessary conditions for international scientific and S&T cooperation. The actors in scientific and/or S&T activities may join international scientific and S&T organisations or associations, participate in international scientific and S&T programmes or projects, scientific and S&T programmes or projects of foreign countries, conclude agreements (contracts) and other agreements with foreign legal entities to perform work in or outside of the Russian Federation in the procedure prescribed by the legislation of the Russian Federation
[140] Available in Russian at www.mon.gov.ru/work/nti/dok/str/ntr.pdf
[141] Austria, Bulgaria, Czech Republic, Finland, France, Germany, Hungary, Israel, Italy, The Netherlands, Norway, Poland, Republic of Macedonia, Romania, Slovak Republic, Slovenia, Spain, Turkey, and United Kingdom.
[142] For the full list of agreements see www.ec.europa.eu/world/agreements/searchByCountryAndContinent.do?countryId=3853&countryName=Russia
[143] ERA.Net RUS – FP7-226164, D 1.3 / Analytical report 3: "State of the art and perspectives of bilateral S&T programmes between EU MS/AC and Russia and of activities of S&T Programme Owners in EU MS/AC towards Russia and in Russia towards EU MS/AC accompanying / complementing bilateral S&T agreements"
[144] Source: Web of Science: Adams, Jonathan & King, Christopher. Global Research Report. Russia. Research and Collaboration in the New Geography of Science. Thomson Reuters: January 2010.
[145] The Institute was established with the aim of uniting the efforts, scientific and material potentials of its Member States for investigations of the fundamental properties of matter. At present, JINR has 18 Member States: Armenia, Azerbaijan, Belarus, Bulgaria, Cuba, the Czech Republic, Georgia, Kazakhstan, Democratic People's Republic of Korea, Moldova, Mongolia, Poland, Romania, the Russian Federation, the Slovak Republic, Ukraine, Uzbekistan and Vietnam. Agreements are signed on the governmental level with Egypt, Germany, Hungary, Italy, Serbia and the Republic of South Africa. www.jinr.ru/
[146] www.istc.ru

numerous governments, international organisations and private sector organisations, providing weapons scientists from Russia and other EECA countries with market-based opportunities to redirect their talents towards peaceful scientific research and innovation.

Partnership and Cooperation Agreements (PCA)

The EC-Russia Partnership and Cooperation Agreement (PCA) was concluded on 24 June 1994. As the PCA expired in 2008, negotiations on a new agreement were launched at the June 2008 Summit between the EU and the Russian Federation. Following the Russia/Georgia conflict the EU postponed the second round. In 2003, four strategic cooperation directions named "Common Spaces" were launched within the PCA. They cover Economic Issues and the Environment; Freedom, Security and Justice; External Security; and Research and Education, including Cultural Aspects. The Common Space on Research, Education, and Culture includes strengthening Russia's participation in the EU Framework Programme, implementation of the Bologna process in higher education in Russia, and harmonisation of rules and regulations. A Permanent Partnership Council (PPC) has been established, which held its first meeting in May 2008.

The Agreement on Cooperation in Science and Technology between the European Community and the Government of the Russian Federation 194 was signed on ***16 November 2000*** and entered into force on 10 May 2001. The Agreement was renewed for another five years[147] following the Council's decision on ***30 March 2009***. The Agreement is a formal basis of cooperation in scientific and technological research between the EU and Russia in the following fields: Environment and Climate Research, including Earth Observation; Biomedical and Health Research; Agriculture, Forestry and Fisheries Research; Industrial and Production Technologies; Materials Research and Metrology; Non-nuclear Energy Transportation; Information Society Technologies; Social Sciences Research; Science and Technology Policy; and Training and Mobility of Scientists. For steering the EU-Russia S&T cooperation and for implementing the agreement, a number of coordination mechanisms have been established. This includes the joint EU-Russia S&T cooperation committee (S&T agreement steering body) and joint thematic EU-Russia working groups on most topics of the FP7: Nanotechnologies, Health, Food/Agriculture/Biotechnologies, Energy, Environment, Aeronautics, Space, Nuclear Energy Fission Research, ICT and Mobility. The working groups involve representatives of the European Commission (of Directorate General Research, except for Space which involves Directorate General Enterprises), Federal Agencies, Russian ministries and scientists, Russian NCPs; on the EU side, these working groups are headed by directors in charge of the corresponding themes.

EU – European Neighbourhood Policy

To make cooperation under the 4th common space of Research and Education operational, two roadmaps have been developed (for the years 2009-2011 and 2010-2012). The roadmaps take stock of Russia's participation in FP7 and coordinated calls. They cover technology platforms, EU-Russia working groups, projects' twinning schemes, NCP activities, initiatives of the European Research Council, Euratom-Russia CA, COST actions, EUREKA and the Joint Research Centre. They also include other EU, pan-European and international S&T programmes involving Russia: ITER, ISTC, ISS, Eureka, CERN as well as bilateral EC MS – Russia S&T activities.

Russia has been one of the target countries in the EU Eastern Partnership and the Northern Dimension initiatives. The European Neighbourhood and Partnership Instrument (ENPI) is the financial tool used to support Russia's participation in these initiatives. The total budget of ENPI is €1.181 billion of which ~10% earmarked for regional projects. The application of ENPI to Russia signifies a move from technical assistance (TACIS) to a more equitable partnership, which previewed equal co-financing from the Russian side. The EU funds for Russia are used to support the implementation of the roadmaps for the 4 common spaces (thematic priority) and Kaliningrad Oblast (geographic priority). The National Indicative Programme for Russia for the years 2007-2010 amounted to €30 million per annum. Key elements of ENPI[148] in Russia are as follows:

1. The national indicative programme, content of which is agreed annually with the Russian Government (National Coordination Unit in the Ministry of Economic Development). With a budget of EUR30 m/year it contains programmes such as the IBPP and the Common Spaces Facility. The funding priorities are four Common Spaces and Kaliningrad. The real budgets were much smaller due to inability of the Russian and the EU side to come to an agreement with regards to funded projects. Only a small part of the reserved €90 million for 2007-2009 were used. As a consequence, a 50% reduction in the new NIP allocation table was previewed for 2011-2013 (€15 million per annum).
   "In contrast to typical EU aid programming documents, the NIP for the Russian Federation does not identify specific priorities and indicators of achievement for the 2007-2010 programming period, because "the Russian side has rejected the idea of deciding in advance on the prioritisation of objectives."[149]
2. The interregional programme contains Erasmus Mundus External Cooperation Window, Tempus, and TAIEX (SIGMA does not apply to Russia). Its priorities are the fourth Common Space (education) for Erasmus and Tempus and four Common Spaces.
3. The regional programme is developed centrally in Brussels and contains multi-country projects in the Eastern Europe Central Asia region (e.g. FLEG). Its priorities are defined on an ad-hoc basis.
4. The Cross-border Cooperation (CBC) programme uses EU structural funds and external cooperation budget pooled with single procedures. Russia benefits from 7 programmes: Kolactic, Karelia, SE Finland, Est-Lat-Rus, Lit-Pol-Rus, Baltic and Black1)Sea (the last two no longer available for Russia). The programme priorities are Common Spaces and the Northern Dimension.

National and Bilateral Programmes

- Federal Targeted Programme "Scientific and Scientific-Pedagogical Personnel of the Innovative Russia in 2009-2013; Start date: 2009; End date: 2013
- Federal Targeted Programme "R&D in Priority Fields of the S&T Complex of Russia (2007-2012)" Start date: 2007; End date: 2012.
- Resolution №220 of the Government of the Russian Federation on the provision of monetary grants to support scientific research activities implemented under the supervision of leading scientists at Russian institutions of higher education, approved on April 9, 2010. Programme funds will be available through a competitive grant process. Grant stipends will be offered in amounts of up to 150 million Rubel for each research project in 2010-2012, with opportunities to extend the research period for 1-2 years, according to an official government release. Competitions are held on annual basis. Start date: 2010; End date: 2012.
- Bilateral programmes may be taken from the ERA.Net RUS D 1.3. Analytical Report 3. The report may be downloaded from www.eranet-rus.eu/en/107.php
- The Russian Foundation for Basic Research has joint agreements and calls with DFG, CNRS, NSFC, BRFBR, NSF/CRDF, INTAS-RFBR 1997, OAD, and CAE.
- The Russian Foundation for Humanities' (RFH) strategy for international cooperation focuses on three target groups: post-USSR countries, European countries, and the countries that traditionally have close relations with the USSR (Mongolia, China, Vietnam, and Taiwan). RFH has established contacts with S&T funding organisations in EU countries (Finland, Germany, and France) in order to organise the joint support of research projects and to exchange experience in research funding

EU Framework Programme for Research and Technological Development

The majority of the NCP host organisations was nominated by the Decree of the Ministry of Education and Science of the Russian Federation from 21 February 2007. The decree was issued in line with the implementation of the Road Map for the Common Space of Research and Education.

In general, selected NCP host institutions are well known and rather acclaimed Russian RTD institutions, RTD funding organisations and universities well embedded into the RTD community of the respective thematic area of the Framework Programme. The type of institution varies from small institutes with 25 – 30 employees to large research institutes and higher education institutions with several thousands of employees[150].
According to the 2011 Decree three ministerial departments are responsible for the Russian NCP system: Department of External Integration, Department of International Cooperation and Department of Prior-

[147] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:092:0003:0004:EN:PDF
[148] Implementation of the ENPI: Analysis of the EU's Assistance to Russia. Briefing paper for the Foreign Affairs Committee of the European Parliament made under the framework contract with the Trans European Policy Studies Association (TEPSA). September 2008.
[149] National Indicative Programme 2007-2010: Russian Federation, p.4. Implementation of the ENPI: Analysis of the EU's Assistance to Russia. Briefing paper. Directorate General External Policies of the European Union. Policy Department External Policies. September 2008. P. 8
[150] IncoNet D4.6a – Analytical Report for strengthening EECA NCPs/NIPs – Russia. Actual Submission date: 11/12/2009.

ity S&T Areas. NCPs' annual reports and requests for funding (subsidies) are also formalised in the decree. Yet, there are neither clear rules nor a timeline for government funding of the NCP activity.

Cooperation with the EU is strengthened within the FP7, especially through coordinated calls between the EC and Russia in thematic priorities of the specific "Cooperation" programme. In these calls, the EC and Russia jointly define specific topics in the frame of a standard call of the cooperation programme. The Russian participants in selected projects will then be funded by the Russian federal budget. Such coordinated calls and topics have been agreed upon in the following areas: Food, Agriculture and Biotechnology, Energy, Health, Nanotechnology, and New Materials. Discussions on coordinated calls are ongoing for Aeronautics, Nuclear Fission, and Space Research. The specific topics of the call are agreed among Russian and EU experts in joint working groups, involving representatives of the Commission and Russian ministries. Working groups are currently running for the FP specific programmes: Nanotechnologies, Health, Food/Agriculture/Biotechnologies, Sustainable Energy, Aeronautics, Space, Nuclear Energy Fission Research, Environment, and Mobility.

Russian organisations were the most active participants in FP7 not only in the EECA region, but also worldwide. In 2010, a significant increase in the number of applications (approximately half of the applications) was noted. The greatest share of participants from EECA countries are organisations from Russia – in case of applications 57.38% and in case of successful applications 59.08%. The biggest number of successful Russian participations is in the Transport Programme.

Lifelong Learning Programme

Russia is eligible to participate in a number of LLP activities: Erasmus Mundus, Youth in Action, Tempus, and Marie Curie Actions. 2009 and 2010 were consolidation years for the Key Activity Languages (KA2) and it is now a common feature in this Key Activity to support projects targeting languages such as Russian[151].

Currently, the European Commission is funding more than 100 Erasmus Mundus master's courses and since 2004 more than 340 Russian students have been selected to study on Erasmus Mundus master's degree programmes in Europe. 70 Russian students have been selected to study on Erasmus Mundus master's courses from September 2010.

Russian students currently studying at a Russian higher education institution on a bachelor, specialist, master or PhD degree programme can obtain a scholarship to study for at least one semester at a European university. This type of mobility requires that Russian and European universities form a consortium and apply to the European Commission for funding. If funding from the European Commission is granted, the consortium of Russian and European universities select bachelor, specialist, master's and PhD students to study at the European partner university. At present the European Commission is funding 2 consortia of Russian and European universities. More than 700 Russian students (bachelors, specialists, masters and PhDs) have obtained the possibility to study in Europe. More information about the 2 consortia is available at the following websites:

1. www.iamonet.de/:
2. www.utu.fi/en/studying/cooperation/emecw.html
3. www.tu-dresden.de/internationales/erasmus_mundus?set_language=en&cl=en

Russia joined the Bologna process in 2003. The EU-Russia cooperation in the sphere of higher education includes facilitating links between Russian and European universities; encouraging awards of joint or double diplomas; establishing quality monitoring systems for Russian curricula and institutions, as well as internal university quality-control systems; supporting Russian participation in the Erasmus Mundus programme; promoting EU studies in Russia (including training for government officials and post-graduate students and the establishment of the European Studies Institute at MGIMO); and promoting the study of Russia and the Russian language in the EU as well as the study of the EU and European languages in Russia[152].

Challenges

Business contributes little to the national expenditure on R&D. In Russia, the business enterprise expenditure for R&D (BERD) fluctuates around 30% (28.7% in 2008)[153]. Production enterprises perform relatively little in-house R&D.

[151] IncoNet D4.6a – Analytical Report for strengthening EECA NCPs/NIPs – Russia. Actual Submission date: 11/12/2009.
[152] www.eeas.europa.eu/delegations/russia/eu_russia/fields_cooperation/higher_education/index_en.htm

To stimulate business involvement in R&D, anti-crisis financial support to enterprises was conditioned by fulfilling the mandatory requirement of increasing production efficiency as well as adopting an innovation-based development programme (including such measures as increased energy-efficiency, introduction of innovative products, and application of modern technologies in industrial production). Similar requirements were introduced for large enterprises, partially or fully owned by the state, and 'natural monopolies'. The requirements for innovation-based development programmes of state-owned companies include undertaking an independent and comprehensive technology audit, building the innovation infrastructure and assuring cooperation with universities, research units, and SMEs. Moreover these companies are encouraged to participate in technology platforms (TP). In April 2011, a similar number of platforms were created in Russia. The governmental commission on high technology and innovations approved the list of 22 TPs and 7 more were placed in a pipeline for merger and further engineering[154].

In April 2010, the Russian Government adopted Decree № 218 "On measures of state support to cooperation among Russian higher education institutions and organisations, implementing comprehensive projects aimed at creation of high-tech production". The decree was adopted with a view to stimulate R&D cooperation between Russian universities and enterprises and to stimulate knowledge-intensive economic activity[155].

According to data provided by the Ministry of Science, the loss of one scientist costs the country an estimated $300,000. Over 10 years (1990-2000), some 16,000 Russian scientists have obtained permanent foreign work contracts and left the country. Although the rate was higher in the early 1990s — 2,000 a year — it is still high, amounting to 1,000 emigrating persons annually. Only about 20 percent of those departing professionals have returned[156]. Researchers share is not large in the total amount of emigrants - 1% on average. If we add the high school teachers, engineers, top managers of enterprises, and students, then intensity of emigration flows from Russia will in some countries exceed 20%. In general, the share of highly qualified people emigrating from Russia is equal to 20%[157].

In order to encourage the development of the scientific potential in Russia and prevent the brain drain of scientists, the George Soros CEU Foundation introduced reintegration grants for research in Russia in 1990s: scientists, who received fellowships for a one-two year research in the West, were offered one-year grants up to $25,000 for research to be conducted in Russia.

To prevent the brain drain in 2010, the Russian Government adopted the Decree № 220 "On measures of attraction of leading scientists to Russian educational institutions of higher professional education". The open public contest for receiving grants of the Government of Russia for state support of scientific researches, which is carried out under the guidance of leading scientists in the Russian universities, was announced in June 2010. There were 507 applications from leading scientists for the contest together with 179 educational institutions of higher professional education (universities can participate in several projects with various scientists). Among 507 leading scientists, 291 are Russian Federation citizens (of whom 73 are working abroad), 10 scientists are citizens of countries-members of the Commonwealth of Independent States, 169 scientists come fromother foreign countries, and 37 people have dual citizenship. The expertise of each application was maintained with equal participation of Russian and international experts. In case of considerable difference of the results of the expertise, the application could be sent for additional expert evaluation by the contest commission. Building on the success of the competition, a repeated call was opened in 2011[158].

The biggest challenge for the country and its modernisation development track is the necessity to take into account both the enormous changes in the political and the economic context which occurred after the dissolution of the Soviet Union, as well as important constraints imposed by the legacy of the past. The pending radical transformation should thus face the institutional and personal resilience. For example,

[153] Science Indicators: 2010. Statistical Databook. Higher School of Economics, Moscow.
[154] www.economy.gov.ru/minec/activity/sections/innovations/formation/doc20110405_05
[155] www.p218.ru
[156] Melkova V., 2001: Russia's Brain Drain. The Russia Journal, 344.
[157] www.horizon.documentation.ird.fr/exl-doc/pleins_textes/divers4/010022327-15.pdf
[158] www.eng.mon.gov.ru/pro/ved/uch/

today's Russian policy admits the "coexistence of increasingly prevalent market-oriented mechanisms for the allocation of economic resources with others that are more social/political network-based". Furthermore, "there is a sharp contrast between progressive territorial, scientific, technological and industrial nodes of excellence and a rather large stagnant pool of firms and organisations with very low productivity and little innovation"[159].

The effects of the 2008-2009 financial and economic crises were noticeable for the Russian R&D sector. They aggravated the previously existing sectoral problems, such as low level of innovative products (goods and services), sales of Russian enterprises (fell by 4.1% at constant prices in 2008) and a decrease of R&D performing personnel (fell by 5% in 2008). Although GERD fell by 1.6% (at constant prices, 2008), mostly due to lower business R&D expenditure, budgetary appropriations on R&D substituted for this gap and grew by 3.5%.

The Russian Government continues its policy aimed at a new quality of economic growth – innovation-based economic growth. The latest policy mix employed by the Russian Government are renewed priorities for technological modernisation, creation of Russian technological platforms, introduction of innovation programmes for state-owned enterprises, financial support to research universities, stimulating the linkages between enterprises and universities, support to the existing pilot national research centres - Kurchatov Institute – and creation of new centres.

Restructuring the S&T system is a prerequisite to fulfil the key goal of technology-based modernisation for the Russian economy. In order to absorb the increasing GERD and budget appropriations for R&D, the Russian S&T system has to raise its efficiency as measured by production outputs. The current outputs (patents, publications, innovation activity) remain rather low. Other existing difficulties of the Russian S&T and innovation system are weak framework conditions for innovation and low level of private sector contribution to GERD. This is reflected in low high-tech exports and low innovation activity of Russian enterprises.

Although the number of R&D personnel employed fell sharply during the 1990s, many research organisations managed to survive, often at a very basic level. Some organisations have been transformed into joint-stock companies while remaining government-owned and government-funded, for example, in the form of block grants from ministries or as contract research and design work from other, production-oriented, state-owned enterprises.[160]

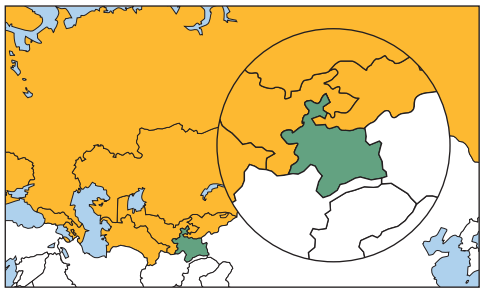
As underlined in the OECD Innovation Review, "RAS remains a glorious learned society but uses its well deserved prestige to resist the need to improve the efficiency of its management", which represents a threat to the overall national S&T system. On the other hand, "improved balance between cooperation and competition among the different components of the public research system" is one of the strengths. This includes an increased share of competitive funding in the RAS budget[161].

At the same time, the marked difference between Russia and the other BRICS countries is that the share of GERD allocated by the higher education science sector is rather low at 6.7% (2007/2008), as compared to 38.4% in Brazil, 20% in South Africa, and 35% in Canada[162]. Many innovative economies are characterised by large-scale applied university research matched against the private sector demand.

The Russian Federation has one of the highest proportions of science and engineering graduates in the world, which is well above the OECD average. It also has very high rates of university admission. Furthermore, like other areas, higher education was not immune from the austerity of the transition years and has suffered some degradation in facilities and services, particularly in the regions. Curricula in many departments are also in need of updating in order to better reflect the labour market's demand for skills. This includes innovation management skills and initiatives that will nurture an entrepreneurial spirit among graduates.

[159] OECD (2011), OECD Reviews of Innovation Policy: Russian Federation 2011, OECD Publishing. p. 12.
[160] OECD (2011), OECD Reviews of Innovation Policy: Russian Federation 2011, OECD Publishing. www.dx.doi.org/10.1787/9789264113138-en
[161] OECD (2011), OECD Reviews of Innovation Policy: Russian Federation 2011, OECD Publishing. www.dx.doi.org/10.1787/9789264113138-en
[162] Data for 2008. Science Indicators: 2010. Statistical Databook. Higher School of Economics, Moscow.

I.9 Country Report Tajikistan



Current State of S&T & Major Policy Challenges

S&T Indicators

TABLE 16: S&T LANDSCAPE 2010

R&D Expenditure as % of GDP	Number of research organisations	Number of researchers
0.06	67	5,617

Research Structure and Policy

The government of Tajikistan has recently adopted a number of science-related laws, e.g., the Law on Science and National S&T Policy in 1998, the Law on the Academy of Sciences of the Republic of Tajikistan in 2002, and a Decree on the Activities of the Academy of Sciences in 2004. A number of decrees have also been adopted to cover the fields of academic accreditation of research organisations and scientific workers and to establish national scientific committees as well as to protect intellectual property. In 2004, also two laws were passed On Invention and On Industrial Samples, respectively. These were followed in December 2006 by a Law on Rights Protection for the Topology of Integrated Microcircuits, then, in March 2007, by a Law on Trademarks and Service Marks and a second Law on Geographical Indicators[163]. Besides, in 2003 a Decree establishing the National Plan of Development of Basic Research in Tajikistan for 2005-2008 was adopted.

The current ***National Development Strategy of Tajikistan 2007- 2015*** that includes the ***Science Development Strategy*** foresees updating the legislative basis of S&T and finding measures to ensure its proper execution. In this Strategy, science is described as a national priority. The Strategy also aims at further strengthening the collaboration between Tajik research organisations and the different ministries, and outlines an ambitious programme for developing scientific cooperation with other countries, including fellow members of the CIS, as well as with international organisations, via intergovernmental agreements and partnerships to be concluded by the Academy of Sciences, research institutes, and universities.[164]

Tajikistan's Science Development Strategy identifies several weaknesses in the national S&T system such as lack of funding and insufficient research infrastructures, many of which were destroyed during the years of the civil war in 1992-1997. The Strategy underlines the need to build sufficient information infrastructures improving the institutes' connection to modern information technologies and making additional scientific literature available in the libraries. There is also lack of highly educated scientific staff that is related to the very low financing of the research sector. To improve the situation, Tajikistan wants to better integrate its higher education and S&T systems. Moreover, the Strategy points out the need to establish national comprehensive S&T programmes that would tackle important scientific and socio-economic problems of the country. It also refers to insufficient international research collaboration despite quite a high number of signed bilateral S&T agreements (see below).

Overall, the Strategy determines the following national priority fields that should contribute to the socio-economic development of the country:

- socio-economic policy;
- hydro energy and complex use of Tajikistan water resources, renewable energy resources, and new energy technologies;
- mineral and raw materials industry, new materials, and modern chemical technologies;
- agro-industrial complex, food safety;
- health and ecological safety;
- information and communication technologies;
- education[165].

[163/164] UNESCO Science Report 2010

[165] Национальная стратегия развития Таджикистана до 2015 года и стратегия снижения бедности на 2006-2015 года: Стратегия развития науки. (National Development Strategy of Tajikistan until 2015)

Important Research Organisations

At the moment the Academy of Sciences of the Republic of Tajikistan is the country's main scientific centre that has an important decision making power in the national S&T policy. The majority of research organisations are concentrated under the Academy of Sciences, the Academy of Agricultural Sciences, and the Academy of Educational Sciences. In addition there are a few research institutes and universities that do not belong to the structure of the Academies.

Current Trends & Challenges in International Cooperation

National Policies

On 15th April 2011, the ***Science Development Strategy*** of Tajikistan designed for 2011-2015 was presented in Dushanbe. The strategy foresees more active international collaboration and increase of foreign funding in S&T up to 20% by 2015 although it does not state what will be the incentives for improved collaboration (see above).

Bilateral Agreements

Tajikistan has signed only ***4 bilateral S&T agreements*** with such EU MS/AC as Austria, France, Germany, and Turkey. Besides government level agreements, bilateral collaboration is established also at the NAS and university level. The Academy of Sciences of the Republic of Tajikistan maintains the widest international connections with scientific centres of near and distant foreign countries. According to the decision of Council Government Heads of CIS and with the purpose of further expansion of integration processes in the field of science, the Academy of Sciences of the Republic of Tajikistan accepts the most active participation in elaboration and realisation of Conventions and Agreements within the framework of the Interstate Integration Committee.

Regional Network/Cooperation

The main collaboration partner in international programmes and co-authored publications is outstandingly ***Russia***, next come the neighbouring countries ***Uzbekistan and Kazakhstan***. The EU Member States and Associated Countries are represented to a much lesser extent. Tajikistan bilateral research collaboration is more oriented towards the region of Central Asia and its neighbouring countries, such as Afghanistan, China, Iran, Pakistan, India, also USA, than towards Europe.

EU - Central Asia Strategy

The common goal of achieving stability and prosperity by means of peaceful inter-action makes Europe and Central Asia partners for increased cooperation. The ***European Commission's Delegation*** in Tajikistan has a substantial programme of operations, with its staff of 24 persons, and with appointment of a resident Ambassador/Head of Delegation. The government's major economic priority is completion of the ***Rogun dam***, for which it would welcome a consortium of international investors. While this project is extremely ambitious it deserves support by the EU since it offers both some chances of advance for the economy, together with regional links to South Asia which could become part of a post-war regional economic recovery.

Partnership and Cooperation Agreements (PCAs)

A ***Partnership and Cooperation Agreement (PCA)*** between the EU and Tajikistan was signed in October 2004 and it was ratified in 2010. PCA provides a framework for policy dialogue and also a basis for cooperation in the scientific field. The EC assistance to Tajikistan focuses on rural development and poverty reduction, agriculture and land reform, promotion of good governance, and economic reforms.

The Cooperation Committee between the European Union (EU) and the Republic of Tajikistan held its first meeting on in March 2011. The EU assistance under ***the Regional Strategy 2011-13*** for Tajikistan amounts to €62 million and will focus on social sector reforms in Health and Social Protection, support to Private Sector Development with a particular focus on agriculture, and strengthening Public Administration and Public Finance Management.

EU Framework Programme for Research and Technological Development

The Tajikistan National Information Point ***(NIP)*** for EU Framework Programmes was established in 2004. It is a non-governmental institution called Society for Development of Scientific Cooperation (SODESCO).

3 Tajikistan research organisations participate in FP7 projects (6 applications). The EC contributes €136.5

thousand to the Tajik participation. In comparison to the FP6, the Tajik participation in the FP is decreasing (5 Tajikistan research organisations participated in FP6 projects).

Development Cooperation Instrument (DCI)

The EU has assisted the countries in this region since their independence to help them achieve the radical reforms needed, assistance has been significantly increased over the last years to help strengthen and deepen relationships with Central Asia. Tajikistan is the poorest country in the region and, therefore, benefits from the highest level of development assistance in the region. DCI work programmes include S&T aspects only in case of research with a special background for the social and economy needs. From 1996 to 2006, a sum €39.5 million was committed to the food security programme in Tajikistan. The main part of this assistance was in the form of budget support for a reform programme in agriculture and social protection.

Lifelong Learning Programme (LLP)

Tajikistan is not involved in Comenius, Erasmus, Leonardo da Vinci, and Grundtvig programmes. The TEMPUS Programme was opened to Tajikistan in 2004. Actively involved in Tempus higher education institutions are the Tajik Technological University, Tajik State University of Commerce, Tajik Pedagogical University, Tajik Technical University as well as the Tajik Agrarian University. Regarding the participation in ERASMUS MUNDUS 2011, 24 Tajik students applied for grants and took part in the scholarships selection.

Further Activities

Tajikistan is also supported by EU programmes at a national level, for an amount of €66 million, the priority areas being:[166]

- Poverty reduction and increasing living standards
- Regional and local community development
- Sector reform in rural development and social sectors
- Good governance and economic reform
- Democratic development and good governance (promoting civil society, social dialogue and democratic processes, judicial reform and rule of law, improving public administration and public finance management)
- Implementing trade and market regulatory reforms, and building administrative capacity

Challenges

The after effects of the breakdown of the Soviet Union in 1991 and the civil war 1992-1997 still challenge the development of Tajik S&T landscape. Both events have disrupted the former Tajikistan's regional links and isolated the scientific community. Furthermore the transboundary cooperation in particular in the field of water and energy management is politically very sensitive.

Because of low governmental investments and funding in science, the modernisation of the S&T landscape has not reached the full potential yet. Also the private sector does not invest in science. The relation between the private sector and the S&T activities in the country can be considered as not existing leading to weak innovation and knowledge transfer system.

Although technical assistance programmes are numerous, the technical equipment of the laboratories and other research facilities is not up to date. The same is true for methodologies (teaching, analyses, technology and information transfer) which still follow the Soviet procedures and do not comply with international standards.

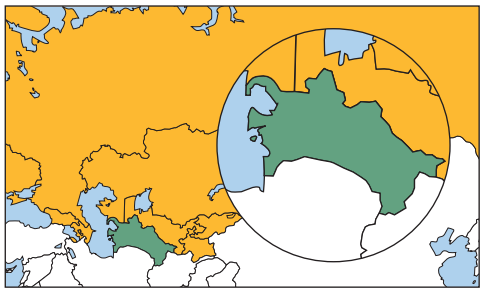
Standard scientific language is still Russian due to the strong academic links with Russia, e.g. all graduate students still receive their PhD title from Russia. Therefore a very small share of scientists speak sufficient English. This hinders Tajik scientist in participation in international conferences and events. Furthermore international travel can seldom be funded by the national research institutions. This reduces scientific mobility substantially.

The underfinanced research sector can not offer attractive positions for young scientists so that many of the highly qualified leave for other jobs and for other countries e.g. Russia, USA. The bureaucratic research structure and the brain drain have created a generation gap in most of the scientific areas and organisations.

Access to international S&T information, networking with European scientist and EU project management skills are just about developing. Furthermore the current financial, banking, and customs system make the common project implementation difficult.

[166] Source: www.ec.europa.eu/europeaid/where/asia/country-cooperation/tajikistan/tajikistan_en.htm

I.10 Country report Turkmenistan



Current State of S&T & Major Policy Challenges

S&T Indicators

TABLE 17: S&T LANDSCAPE 2010

R&D Expenditure as % of GDP	Number of research organisations	Number of researchers
n/a	46	n/a

Research Structure and Policy

The development of science is of important state significance in Turkmenistan. Since the first days of the election to the post of the head of state, President Gurbanguly Berdymukhammedov has been paying much attention to the issues of the scientific, technological and innovative development. Initiated by the President, stable legal grounds were set up in the country for free scientific creativity and the guarantees for the scientific activity are fixed. The grounds for free scientific activity are fixed in item 39 of the Constitution of Turkmenistan; a new edition was adopted in September 2009. The constitution sets the right of the citizens in Turkmenistan for free scientific activity. The regulation of rights and guarantees of the scientific activity is reflected in the law "On Status of the Scientific Researchers in Turkmenistan" that was adopted in August 2009. The law creates and fixes legal grounds for the training of scientific researchers not only during the postgraduate courses, (post)graduate (advanced students') work at a military academy/ college, a doctoral candidacy, the process of seeking national scientific centres but foreign research centres which have a significant influence on the enhancement of the cooperation between scientists in countries with foreign colleagues. The law considerably expands the rights of scientific researchers and creates possibilities for free research creativity. For instance, one of the rights of scientific researchers with a Doctor of Sciences degree is having a vacation for 45 calendar days and for those with a Candidate of Sciences degree it is 36 calendar days. Great attention is paid to the scientific staff that is at the beginning of career. One of the examples can be the provision of the law that foresees research grants to applicants of the postgraduate and doctoral candidacy courses as well as, in line with item 8 of the law, the right to get additional literature in the amount of a two-month research grant. Stable legal grounds of the activity of scientific researchers set the basis for creative intellectual work of scientists and researchers, the scientific development, and the expansion of cooperation between scientists and young researchers.

The President of the country also pays great attention to the strategic development of science and the identification of scientific priorities. The programme tasks of the development of science were formulated by the head of government at the expanded sitting of the Cabinet of Ministers of Turkmenistan on 12 June 2009 where the concept of the scientific development, but also priorities of the scientific research were announced.

At this sitting, fundamental principles of the state policy formation of the country in the area of science and priorities in the scientific research have been formulated.

The head of the government marked out the priority areas as follows:

- complex use of natural resources, extraction of mineral resources, petrochemistry, gas and mineral resources processing;
- electric power engineering, study and wide use of alternative energy sources (solar, wind, geothermal waters, biogas, etc);
- textile industry;
- seismology, city planning and architecture;
- transport and communication area, development of information systems and communication;
- product automation;
- introduction of ecologically clean and non-waste technology;
- environmental health, favourable impact on climate conditions;
- development of agricultural and industrial complex, rational use of land and water, selection work, selection of new sorts of crops, including increase of yield based on scientific evidence , comprehensive organisation of greenhouses;
- improvement of territorial allocation of the production;
- efficient use of material and labour resources in national economy;
- medicine (prevention and treatment), pharmaceutics;
- the sciences;
- the humanities and, specifically – study and development of the Turkmen language, study and development of classics in the Turkmen literature and philosophical heritage of Turkmen philosophers of the past, popularisation of their creation works, conservation and study of archaeological monuments, study of ancient, medieval, new and modern history of Turkmenistan, folklore and culture of the Turkmen people, creative rethinking and scientific development of problems of the modern epoch and new state ideology of Turkmenistan.

Perspective tasks were identified for each branch of science. The most important role is to ensure the economic development of the country and to restructure the industry, the head of state pays to the fundamental science, the research of which should be directed to the solution of actual issues to form new technological aspects of the industry branches based on wide implementation of high technologies: nanotechnologies, know-how, latest achievements of fundamental sciences, and improvement solutions.

Great attention is paid in the country to the support of scientific and research activity of the youth. In the country, in line with the Decree of the President of Turkmenistan №5638 as of 8 April 2002, a contest for young scientists has been arranged in different branches of research studies. Any young person who works or is a student, who is inclined to scientific and research activity and who is under 37 years old, can participate. The results of the made research are summed up on an annual basis and the winners are awarded with valuable prizes and gifts. The awards are granted to the winners in a solemn situation in the presence of government members. Thus, currently in 2011, 60 winners of the contest received valuable prizes and gifts, among them post graduates, teachers, and students.

The President of Turkmenistan, Gurbanguly Berdymukhammedov, constantly supports the professional training of young scientists and their scientific creative activity. By the Decree of the President as of 14 January 2008, clinical studies, postgraduate courses, and the institution of doctoral candidacy have been restored, and since then application processes for young people who want to realise their intellectual potential in the area of science have started and scientific research that added inspiration and impulse to the scientific research activity of the youth.

Important Research Organisations

In June 2009, during the sitting of the Cabinet of Ministers of Turkmenistan, the President of the state reformed and set new structures of the science management.

In line with the Decree of the President of Turkmenistan №10458 as of 12 June 2009 "On Issues of the Academy of Sciences of Turkmenistan", the Academy of Sciences of Turkmenistan was set up in the country that heads all activities regarding the development and organisation of science in Turkmenistan.

In line with the Decree, 11 institutes and libraries moved under the Academy of Sciences that are funded from the budget and 2 subdivisions in the institutes as well as from the editorial staff and the publishing house "Ylym" are funded on a self-financing basis.

By the Decree of the President of Turkmenistan of 7 August 2009, provision on the Academy of Sciences of Turkmenistan has been approved. In line with the provision and among the major functions of the Academy are: implementation of the scientific and technical policy of the state into life, projection of the science, engineering, and technological development and identification of the priorities of their development; efficient increase of the scientific and research studies; implementation into production of the scientific international and national achievements and other functions. The Academy of Sciences as the major scientific and research centre is responsible for important tasks of the coordination of scientific and

research activities of higher educational institutions and branch scientific and research institutes.

There are 21 higher educational institutions in Turkmenistan, among them the following four universities: Turkmen State University after Makhtumkuly, Turkmen Agricultural University after S.A. Niyazov; International Turkmen-Turkish University, Turkmen State Medical University;

Three educational academies – Academy of State Service under the President of Turkmenistan, Academy of Arts and Academy of Police;

Institutes: Institute of International Relations, the Military Institute, Military and Sea Institute, Institute of Culture, Institute of World Languages, Institute of Economy and Management, Institute of Transport and Communication, Institute of Physical Culture, Sport and Tourism, National Conservatory; Pedagogical Institute, Polytechnic Institute, Energy Institute, Branch of Moscow Institute of Oil and Gas after Gubkin, Agricultural Institute.

Scientific research is made in the higher educational institutions within the framework of social and humanitarian issues as well as in the area of fundamental and technical sciences in the Institute of Transport and Communication, Polytechnic and Energy Institutes, and the State University.

Branch research centres conduct large research work and science development. Those are:

- In the area of building state, democracy, and human rights: National Institute of Democracy and Human Rights at the President of Turkmenistan; Institute of State and Law of Turkmenistan;
- In the area of economy: Institute of Strategic Planning and Economic Development;
- In the area of library science, maintenance and transfer of information: National Library of Turkmenistan after S.A. Niyazov;
- In the area of environment protection and climate change: Institute of Deserts, Flora and Fauna of the Ministry of Nature Protection;
- In the area of water resources: Institute Turkmen Suwylymtaslama of the Ministry of Water Resources;
- In the area of medicine; Research and Clinical Centre of Mother and Child after Gurbansoltaneje; Research and Clinical Centre of Oncology of Turkmenistan; Research and Clinical Centre of Eye Diseases;
- In the area of oil and gas: Institute "Nebitgazylymtaslama" of the State Concern Turkmengas;
- In the area of geology: Scientific and Research Geological Exploration Institute of the Ministry of Oil and Gas Industry and Mineral Resources;
- In the area of agriculture: Scientific and Research Institute of Land Development; Scientific and Research Institute of Cotton Growing; Scientific and Research Institute of Cattle Breeding and Veterinary Science.

Resulting from the set up of the legal grounds allowing to making scientific research and development in the private structures and by individual researchers, private consulting companies began to set up in Turkmenistan that also make scientific and research studies and contribute to the development of science. The scientific and consulting centre "Altyn Umyt" can act as an example of development of scientific and research activity.

Current Trends & Challenges in International Cooperation

National Policies

Expansion of the international cooperation plays an important role in the implementation of the outlined plans on science development. The President of Turkmenistan also formulated strategic approaches in this direction at the historic for the science expanded sitting of the Cabinet of Ministers of Turkmenistan on 12 June 2009. Having noticed the important role of the international cooperation in the science development and stressing the areas of that cooperation, the President focused on three principle aspects: a) wide /useful contacts; b) exchange of experience between Turkmen scientists and teachers, and their foreign colleagues and c) facilitation for the international cooperation in the area of science and technology.

To implement the marked areas in the expansion of the cooperation, there is a legal basis in Turkmenistan which is regularly enhanced with new laws, and the President of the country regularly initiates their adoption. Thus, new laws have been adopted such as the Laws of Turkmenistan "On Scientific and Technological Policy" and "On Scientific Intellectual Property" that exist in the country since 1992; and new Laws considerably expand the legal grounds of international contacts and cooperation. For instance, an important step in this area is the Law of Turkmenistan "On the Status of the Scientist in Turkmenistan" that was adopted in August 2009 and that sets the legal basis for the training not only during postgraduate courses, (post)graduate (advanced students') work at a military academy/college, doctoral candidacy, seeking of national scientific centres but foreign research centres. The law sets the legal basis and has a significant influence on cooperation expansion of the scientists of the country with the foreign colleagues already from the very beginning of the scientific career of the young scientists that is important in setting stable long-term research contacts with scientists from foreign countries.

Partnership and Cooperation Agreements (PCAs)

Presently, Turkmenistan has signed over 30 agreements on scientific and technological cooperation with countries from different regions of the world. Most of them are CIS states, scientific contacts and cooperation which are the base for bilateral agreements. Thanks to the initiatives of the President of the country on expansion of the international cooperation in the area of science and technologies, the number of such agreements grows annually.

A considerable package of agreements of cooperation in the area of science and technology has been signed for the years of independence with the neighbouring country Kazakhstan. Thus, , three agreements, related to the issues of scientific and technological cooperation and training of scientific-pedagogical staff were immediately signed and came into force in Almaty on 27 February1997. These are:

- The Agreement between the Government of the Republic Kazakhstan and the Government of Turkmenistan on cooperation in the area of training and certification of scientific and scientific-pedagogical staff of the highest level of proficiency;
- The agreement between the Government of the Republic Kazakhstan and the Government of Turkmenistan on cooperation in the area of science and technologies;
- The agreement between the Government of the Republic Kazakhstan and the Government of Turkmenistan on cooperation in the area of education.
- On 5 July, 2001, this list was enhanced by the agreement between the Government of the Republic Kazakhstan and the Government of Turkmenistan on mutual acceptance of documents on education, scientific degrees and ranks.

During a visit to Astana in May 2007, the list of available agreements was expanded by the new contract between the Republic of Kazakhstan and Turkmenistan on trade-economic, scientific-technological and cultural cooperation till 2020, signed by the governments of both countries on May, 28th, 2007 and ratified by Mejlis of Turkmenistan on December, 28th, 2007. The programme of trade-economic, scientific-technological and cultural cooperation is attached to the signed contract between the Republic of Kazakhstan and Turkmenistan until 2020 in which priorities of the scientific-technological cooperation are defined among all the others as well.

Ukraine acts as an important partner in the area of scientific and technological cooperation with Turkmenistan. Bilateral cooperation has been activated after having signed the agreement between the Cabinet of Ukraine and the Government of Turkmenistan on mutual acceptance of documents on education, scientific (academic) degrees and academic ranks in the education area in 2001. And in the area of scientific-technological cooperation, the relations began already to develop on the level of subjects of administrative-territorial divisions. Thus, on 22-23 March 2005, the agreements between Donetsk regional administration and Khakimlik (local authorities) of Balkan province of Turkmenistan were signed on trade-economic, scientific-technological and humanitarian cooperation among others which testifies the expansion of contacts and cooperation in the area of science and technology.

Since 2009, scientific and technological cooperation with the Republic of Belarus has actively begun to develop. On 18-19 June 2009, during the visit of the President of the Republic of Belarus to Turkmenistan, the agreement between the Government of the Republic of Belarus and the Government of Turkmenistan on cooperation in the area of science and technologies was signed among other agreements. And during the return visit of the President of Turkmenistan, Gurbanguly Berdymuhamedov, to the Republic of Belarus on 25-26 January 2010, the agreement between the Government of Republic of Belarus and the Government of Turkmenistan on mutual acceptance of documents on education, scientific degrees and ranks was signed among others which creates a wide range of possibilities for scientific networking between the two countries.
A large package of agreements including the agreement on trade-economic, scientific- technological and cultural cooperation was signed with Russia in July

2007 that facilitated the activation of contacts in the area of education for the recent years, and also cooperation in the area of science and technologies. Since 2010, scientific and technological cooperation has received further development on the level of subjects of the Russian Federation; and the Agreement on Cultural and Scientific-Technological Cooperation with Tatarstan was concluded.

With Uzbekistan, the Agreement on Scientific and Technological Cooperation was concluded on 22 February 2010.

The big impulse in the development of scientific and technological cooperation with the European Union was given during the meeting of the President of Turkmenistan, Gurbanguly Berdymuhamedov, and the Chairman of the European Union, Zhoze Manuelja Barrozu, on 15 January 2011 when the President of the country noted that the important direction of cooperation is the expansion of scientific contacts and professional training in the area of science and technology.

Regional Network/Cooperation

Now, in the country, a project IncoNet CA/SC is carried out, which unites 28 organisations in the consortium, including the Scientific and Consulting Centre (SCC) "Altyn Umyt". SCC "Altyn Umyt" implements the project in Turkmenistan aiming at the expansion of scientific contacts and cooperation between scientists of the country and a consortium. Germany, Estonia, Greece, and others act as major countries for cooperation. Recently, the Academy of Sciences of Turkmenistan has become the partner in the project implementation "Policy Dialogue in ICT to an Upper Level for Reinforced EU-EECA Cooperation" whereas France acts as the main partner.

In the country, except for the national scientific magazines such as "Science and Technology in Turkmenistan", "Economy of the Golden Age", "Heritage", and others, the international magazine "Problem of Deserts Development" is available as well, and both scientists and researchers from other countries of the world publish together with the Turkmen scientists the results of the research.

EU – Central Asia Strategy

Main objectives of the international cooperation for the country are carrying out research works and obtaining scientific achievements in such areas as renewable energy sources; rational use of water resources; conservation of the environment and climate change; information-communication technologies in education, sciences and medicine (distance learning, telemedicine, etc.); social and economic research aiming at searching for the scientifically justified solutions of the country's development programmes elaboration. Achievement of results in resolutions of such priority problems for the country as training of the scientific staff who can apply modern methods of carrying out research by means of the latest technologies; exchange of scientists and short-term trainings; improvement of professional skills through participation in seminars and symposiums, and expansion of mobility of scientists through programmes of Master's training and PhD doctors.

National and bilateral programmes

- the list of priority directions of science and technologies in Turkmenistan and directions of performance of research works on them for 2011-2015. It was approved by the Decree of the President of Turkmenistan №11454 from 10 January 2011. Start: January 2011; execution period: 2015;
- the programme of trade-economic, scientific-technological, and cultural cooperation between the Republic of Kazakhstan and Turkmenistan for the period until 2020. It was approved by the contract between the Governments of two countries on 28 May, 2007. Started: May 2007; end date: 2020

EU Framework Programme for Research and Technological Development

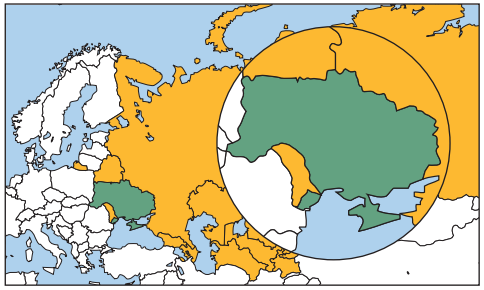
Currently, there is no existing NCP, but its set up is planned.

Challenges

In the development of the international cooperation there are certain difficulties which should be overcome step by step. At the political level, in the expansion of the international cooperation there are no obstacles and the governments conclude required agreements and contracts, accept programmes in priority directions and legal acts for scientific cooperation, and decisions on research financing. In the expansion of the cooperation between scientists of Turkmenistan and the European Union, there are certain barriers in interaction. The scientific community in our country does not completely possess information on research programmes of the European Union, rules of documents' submission,a choice of topics, and a consortium. Applications submitted for the participation of the research centres in the country mostly are rejected by the evaluation commissions. One of the ways of the international cooperation development in the area of scientific research is a wider cooperation in the drawing up of joint projects and applications.

In Turkmenistan, the legal basis was created to involve private research centres in scientific cooperation. This example of participation in the SCC project IncoNet CA/SC testifies the involvement of the private structures into the international scientific community. However, expansion of such participation will depend on financial possibilities of private structures as their activity is based on self-financing.

I.11 Country Report Ukraine



Current State of S&T & Major Policy Challenges

S&T Indicators

TABLE 18: S&T LANDSCAPE 2010-2011

R&D Expenditure as % of GDP	Number of research organisations	Number of researchers
0.82[167]	1303[168]	141,1[169]

Research Structure and Policy

Ukraine has continued to update its research policy with more direct and sustainable economic development objectives. The country has implemented extensive scientific and technology cooperation with the countries of the world to raise the quality of the national scientific research and technologies that are produced on the basis of this research as well as integration of the Ukrainian scientific potential into the European and world research areas. The foreign policy of Ukraine is to ensure support of Ukrainian science, culture, and education and saving of intellectual potential as well as equal development in all fields of the Ukrainian culture, acceleration of the national renaissance, and development of free cultural and humanitarian exchange with the countries of the world.

The legal basis of the S&T policy in Ukraine is composed of the Constitution of Ukraine and the following Laws of Ukraine: "On Scientific and Scientific and Technological Activities" (adopted in 1991, the last amendments introduced in 2011); "On the Public Forecasting and Development of the Economic and Social Development Programmes of Ukraine" (adopted in 2000); "On Priorities of Science and Technology Development" (adopted in 2001, last amendments introduced in 2010); "On Scientific and Scientific & Technological Examina-tion" (adopted in 1995, last amendments introduced in 2006); "On Scientific and Technologi-cal Information" (adopted in 1993, last amendments introduced in 2011); "On Legal Specifics of Functioning of the National Academy of Sciences of Ukraine, Field Academies of Sciences and Their Property Complex" (adopted in 2002, last amendments introduced in 2010); "On Innovation" (adopted in 2002, last amendments introduced in 2011); "On Scientific Parks" (adopted in 2009, last amendments introduced in 2010); "On the National Programme of In-formation" (adopted in 1998, last amendments introduced in 2010); "On State Regulation of Actions in the Technology Transfer Field" (adopted in 2006, last amendments introduced in 2011); "On Priorities in Innovation Activities in Ukraine" (adopted in 2011). It is worth emphasising that the mentioned Laws of Ukraine include part(s) related to international cooperation.

In addition, central executive authorities, whose activities are related to S&T, have introduced internal documents to regulate S&T activities.

The Law of Ukraine "On Priorities of Science and Technology Development" defines the following national priorities up to 2020:

- basic scientific research of the most important problems of scientific and technological, social and economic, political and human potential development to ensure Ukraine's competitiveness in the world and sustainable development of its society and state;
- information and communication technologies;
- energy and power efficiency;
- efficient nature management;
- life sciences, new technologies of prevention and treatment of the most wide-spread diseases;
- new substances and materials.

The S&T priorities are defined according to the National Target S&T and Innovation Development Forecast Programme of Ukraine. They are discussed by the scientific community and submitted by the Cabinet of Ministers of Ukraine to Verkhovna Rada of Ukraine for correction.

According to the a/m Law of Ukraine, on September 07, 2011, the Cabinet of Ministers of Ukraine adopted a Resolution "On Approval of the List of Priority Thematic Directions of Scientific Research and Science and Technology Designs for the period up to 2015".

The Law of Ukraine "On Priorities in Innovation Activities in Ukraine" defines the following strategic innovation priorities for the period 2011-2021:

- assimilation of new technologies of energy transportation, putting into operation of energy-efficient and resource-saving technologies, assimilation of alternative sources of energy;
- assimilation of new technologies of high technology development of the transportation system, rocket and space field, aircraft industry and shipbuilding, armament and military technologies;
- assimilation of the new technologies of materials production, their processing and interconnection; creation of the nano-materials and nano-technologies industry;
- technological modernisation and development of agro-industrial complex;
- introduction of new technologies and equipment for a quality medical service, treatment and pharmaceutics;
- wide use of technologies of cleaner manufacturing and environment protection;
- development of modern information and communication technologies and robotics.

The main S&T coordinating agency in Ukraine is the Ministry of Education and Science, Youth and Sport of Ukraine.

The newly established State Agency on Science, Innovation and Informatization of Ukraine is a part of the central executive authority system to implement the state policy in the field of scientific, scientific-technological and innovation activities, informatization, formation and use of the national electronic information resources and ensuring conditions to create information society.[170]

Also, according to the Resolution of the Cabinet of Ministers of Ukraine, the State Agency on Science, Innovation and Informatization of Ukraine is the main administrator of the budget funds and responsible authority for implementation of the budget programme "Fulfilment of Ukraine's Commitments in the Field of International Science and Technology Cooperation".

Important Research Organisations

The National Academy of Sciences of Ukraine is the highest state-supported research organisation, enrolling academicians, corresponding members, and foreign members. It integrates all researchers of its institutions and carries out studies in various branches of knowledge, develops scientific fundamentals for technological, socio-economic and cultural advancement of the nation. According to its Statute, the Academy enjoys the right of self-government as regards making decisions about its own activities. It comprises three sections incorporating 14 research departments, including the Department of Information Science. The Academy has six regional science centres, which are also subordinated to the Ministry of Education and Science of Ukraine. Their activities are aimed towards promoting the R&D potential of the respective regions, combining scientists' efforts to address priority regional issues. The basic elements in NAS structure are research institutes and other similar institutions.

The National Academy of Sciences of Ukraine (NASU) endeavours to advance international scientific ties, and further integration into the world academic community. Academy institutions are engaged in quite a number of joint research projects under direct bilateral agreements with foreign research institutions

[167] State Statistics Service of Ukraine: Science and Technology Activities in Ukraine - Statistical Data Collection (Державна Служба Статистики України: Наукова та інноваційна діяльність в Україні - Статистичний збірник, ДП „Інформаційно-видавничий центр Держстату України") Kiev, 2011, p. 178 (data for 2010)

[168] State Statistics Service of Ukraine: Science and Technology Activities in Ukraine - Statistical Data Collection (Державна Служба Статистики України: Наукова та інноваційна діяльність в Україні - Статистичний збірник, ДП „Інформаційно-видавничий центр Держстату України") Kiev, 2011, p. 10 (data for 2010)

[169] State Statistics Service of Ukraine: Science and Technology Activities in Ukraine - Statistical Data Collection (Державна Служба Статистики України: Наукова та інноваційна діяльність в Україні - Статистичний збірник, ДП „Інформаційно-видавничий центр Держстату України") Kiev, 2011, p. 31 (data for 2010)

[170] www.dknii.gov.ua/index.php/joomla-license/2010-08-21-12-59-38

and those financed by grants provided by numerous international science foundations and programmes.

NASU concluded agreements and set up intellectual contacts with research centres in more than 50 countries of Europe, Asia, and the Americas, in particular with the German Research Society (DFG), the National Centre for Scientific Research (CRNS, France), the National Research Bureau of Italy (CNR), the National Research Council of Turkey (TUBITAK), and many foreign universities. It has significantly advanced multilateral collaboration of the academies of sciences of the Black-Sea region countries.

NASU is involved in the activities of over 20 prestigious international research organisations: International Institute for Applied Systems Analysis (IIASA, Austria), Joint Institute for Nuclear Research (Russia), European Centre for Nuclear Research (CERN), and it interacts extensively with UNESCO, IAEA, and WHO.

The Academy and its institutions represent Ukraine in the International Council for Science (ICSU) and in more than 30 professional science unions and associations.

As of March 2010, there are 881 ***universities***, colleges, and technical schools in Ukraine. The following universities make the top five according to the national rating of 2011 conducted by the Project "Top-200 Ukraine":

- Taras Shevchenko National University of Kyiv;
- National Technical University of Ukraine "Kyiv Polytechnic Institute";
- Bogomolets National Medical University;
- National University of Kyiv-Mohyla Academy;
- V.N.Karazin Kharkiv National University.

The rating includes the following factors:

a. quality of scientific and teaching potential;
b. quality of education;
c. international recognition, i.e. S&T research and international S&T cooperation make a part of the rating.

In 2007, the Cabinet of Ministers of Ukraine adopted a Resolution "On Approval of the Concept of the State Target Programme "Science in Universities" for 2008-2012". The main objectives of the Programme are to ensure legal, economic and organisational components to boost scientific activities and to improve their integration with university education, to create, as an experiment, universities of research types in order to train experts able to carry out competitive research.

As regards the ***private sector***, it is a source (along with other sources) for financing of science and technology research and development in Ukraine[171]. At the same time, several private universities of Ukraine claim that they conduct S&T research at their institutions[172].

Current Trends and Challenges in International Cooperation

National Policies

The S&T international cooperation factor is considered of high importance in and for Ukraine. To facilitate cooperation between Ukraine and the European Union, the sub-committee №7 "Science and technologies, researches and developments, education, culture, social health, information society and media" was established in accordance with the Resolution №1074 of 13 June 1998 of the Cabinet of Ministries of Ukraine. This sub-committee has launched a working dialogue between the central executive authorities of Ukraine and corresponding subdivisions of the European Union on the following topics: socio-economic development; cooperation in education, science and culture; health protection and information society.

The policy drive for the EU-Ukraine science and technology cooperation includes the following:

- European Neighbourhood Policy
- EU-Ukraine Association Agenda to prepare and facilitate the implementation of the Association Agreement
- National Indicative Programme 2011-2013
- Agreement on Cooperation in Science and Technology between the European Community and Ukraine

The developed documents read, in particular,

"Support for scientific and technological cooperation will also be important with a view to contributing to sustainable and equitable economic development of Ukraine including through fuller participation in research-related activities such as the 7th Framework Programme, joint research projects, the Marie Curie international mobility scheme for scientists and practical training at the seven institutes of DG Joint Research Centre (DG JRC)."

The EU-Ukraine Association Agenda to prepare and facilitate the implementation of the Association Agreement contains a section related to science and technology which provides for the following:

- renew and activate the EC-Ukraine S&T cooperation agreement, in order to enhance the participation of Ukrainian research entities in FP7 projects;
- use the available tools (S&T agreement, INCO-Nets) in order to prepare for a possible association of Ukraine to the Research Framework Programme;
- Ukraine to promote the activities of the ICT National Contact Points and involve the private sector in the research cooperation through participation in the ICT Theme of the 7th Framework Programme for Research.

Bilateral Agreements

Ukraine is involved in a wide range of S&T cooperation on the basis of bilateral agreements. It has agreements on science and technology cooperation with 11 EECA countries: Azerbaijan, Armenia, Belarus, Georgia, Moldova, Russia, Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan, and 17 EU countries: Austria, Bulgaria, Germany, Estonia, Finland, France, Greece, Hungary, Italy, Latvia, Lithuania, Poland, Portugal, Romania, Slovakia, Slovenia, and Spain. The agreements define specific areas in which scientific potential on the bilateral level can be used most effectively. These agreements were concluded on the governmental level with the corresponding ministries of the partner countries.

The total number of S&T bilateral agreements concluded by Ukraine is more than 50.

In addition, the following bilateral agreements have been concluded by the National Academy of Sciences of Ukraine.

Also bilateral cooperation agreements have been concluded on the university level by the key Ukrainian universities.

Regional Network/Cooperation

Ukraine has close S&T cooperation links with the neighbouring countries based on bilateral agreements.

Networking/cooperation is also ensured by four cross-border programmes implemented within ENPI:

- Cross-Border Cooperation Programme Poland-Belarus-Ukraine 2007-2013
- Joint Operational Programme Romania-Ukraine-Republic of Moldova 2007-2013
- Joint Operational Programme Hungary-Slovakia-Romania-Ukraine 2007-2013
- Black Sea Cross-Border Cooperation Programme 2007-2013

According to the survey conducted by G.M. Dobrov Centre for Scientific and Technological Potential and Scientific Studies (STEPS Centre) of the National Academy of Sciences of Ukraine with STCU projects partners, Ukraine has close cooperation (in Europe) with Germany, Russia, France, the United Kingdom, and Poland.

The number of co-publications is considered by experts as an important factor to characterise S&T networking and cooperation. For further information, please see the table below.

European Neighbourhood Policy

The European Neighbourhood Policy (ENP) is one of the European Union's newest external relations policies, aiming to bring Europe and its neighbours closer, to their mutual benefit and interest. It was first outlined in a Commission Communication in March 2003, followed by a more developed European Neighbourhood Policy Strategy Paper published in May 2004 in order to avoid creating new borders in Europe after enlargement of the EU with 10 new member countries. In October 2003, the European Council in Brussels endorsed this initiative and encouraged the Commission to take it forward. The Commission then started explanatory discussions with two of the three East European states that have Partnership and Cooperation Agreements (PCAs) in force, namely Ukraine and Moldova.

In 2010, an intensive and varied range of EU-Ukraine meetings took place, most formally at the level of the EU-Ukraine Summit, the Cooperation Council and the seven subcommittees. In addition, progress in implementing the Association agenda was reviewed

[171] www.mon.gov.ua/newstmp/2010/18_10/1
[172] www.osvita.com/publications/22-10-2010/1287764567/

Partner country	Institution	Date of signing	Name of Agree-ment/Cooperation Programme
Armenia	National Academy of Sciences of the Republic of Armenia	01/2005	Agreement on S&T Cooperation
Azerbaijan	Academy of Sciences of Azerbaijan	05/1996	-
Austria	Austrian Academy of Sciences	05/2004 21/09/06 (renewed)	Protocol
Belarus	National Academy of Sciences of Belarus	07/02/2002	Agreement on S&T Cooperation
Belgium	Ghent University, Belgium	14/03/1996	-
Bulgaria	Academy of Science of Bulgaria	07/1996	-
Canada	Royal Society of Canada	22/05/1997	-
China	Chinese Academy of Sciences, Chinese Academy of Social Sciences, Chinese State Fund of Natural Sciences, People's Government of Anhoi, People's Government of Zhejiang, Zhejiang University, Nanjin University of Aeronautics and Astronautics, Beijing Science and Trade Company „Dajieda"	21/09/2005 03/05/1999 06/07/1993 05/07/2004 05/07/2004 23/12/2005 28/05/2004 16/02/2000	-
Cuba	Cuban Academy of Sciences	1999	-
Czech Republic	Academy of Sciences of the Czech Republic	31/10/2000	-
Egypt	Academy of Scientific Research and Technology of Egypt	22/04/1994	-
Estonia	Estonian Academy of Sciences	02/10/200	-
Finland	Academy of Finland	31/10/1994	-
France	University of Toulouse – Paul Sabatier; CNRS	12/02/2004	-
	European Scientific Association of Geo Research (EISCAT)	18/11/2005	-
	European Organization for Nuclear Research (CERN)	08/06/2006	Memorandum of Understanding
Germany	(DFG) Deutsche Forschungsgemeinschaft	04/07/1995	Agreement on S&T Cooperation
Great Britain	London Royal Society	07/10/1991	-
Hungary	Hungarian Academy of Sciences	03/08/2006	-
Italy	University of Catania, Accademia Nazionale dei Lincei, National Research Council (CNR)	1994 25/01/1994 06/12/2005	-
India	Ministry of Sciences and Technology of India, ARC International, National Academy of Sciences of India	09/06/1993 07/04/1994 20/06/2003	-
Israel	Israel Academy of Sciences and Humanities	12/1993	-
Kazakhstan	Ministry of Sciences – Academy of Sciences of Kazakhstan	05/1998	-
Korea	Academy of Sciences of Korean People's Democratic Rep.	10/09/1999	-
Kyrgyzstan	National Academy of Sciences of Kyrgyz Republic	08/1996	-
Latvia	Latvian Academy of Sciences	26/11/1997	-
Lithuania	Lithuanian Academy of Sciences	10/1994	-
Macedonia	Macedonian Academy of Sciences and Arts	19/02/1997	-
Moldova	Academy of Sciences of Moldova	03/1996	-
Mongolia	Mongolian Academy of Sciences	18/04/2006	-
Monte Negro	Monte Negro Academy of Sciences and Arts	06/06/2006	-
The Netherlands	Dutch Ministry for Economic Affairs	25/10/1995	-
Poland	Polish Academy of Sciences, Polish Academy of Arts and Sciences	01/07/1997 22/03/2006 (renewed)	-
Romania	Romanian Academy	25/04/1995	-
Russia	Russian Academy of Sciences, Siberian Branch of the Russian Academy of Sciences	01/07/1992 07/1998	-
Serbia	Serbian Academy of Sciences and Arts	21/02/2006	-
Slovak	Slovak Academy of Sciences	18/11/2004	-
Tadjikistan	Academy of Sciences Republic of Tajikistan	05/1996 28.04.2006 (renewed)	-
Turkey	TUBITAK, Turkish Academy of Sciences	06/06/2003 15/06/2004	-
Turkmenistan	Turkmen Academy of Sciences	06/1996	-
USA	San Jose State University, Pennsylvania State University, Ukrainian Free Academy of Sciences in the United States	19/10/1993 24/04/1993 14/01/2000	-
Uzbekistan	Uzbek Academy of Sciences	08/06/1995	-
Vietnam	Vietnam Academy of the Humanities, Vietnam Academy of Science and Technologies	27/09/2005 26/12/2000	-

at the level of the Joint Committee of Senior Officials. More broadly, Ukrainian authorities and civil society representatives participated actively in the multilateral framework of the Eastern Partnership, and contributed to the working platforms. On a bilateral basis, Ukraine and the EU also discussed institutional capacity building in the framework of the Eastern Partnership Comprehensive Institution Building Programme.

Partnership and Cooperation Agreement

Current legal basis of the EU-Ukraine relations is laid down in "The Partnership and Co-Operation Agreement between the European Communities and Their Member States and Ukraine" from 14 June 1994 (in force since 1 March 1998), which initiated the cooperation on political, economic and trade, and humanitarian issues.

The objectives of the partnership are defined in Article 1: "A Partnership is hereby established between the Community and its Member States, of the one part, and Ukraine, of the other part. The objectives of this Partnership are:

- to provide an appropriate framework for the political dialogue between the Parties allowing the development of close political relations;
- to promote trade and investment and harmonious economic relations between the Parties and so to foster their sustainable development;
- to provide a basis for mutually advantageous economic, social, financial, civil scientific technological and cultural cooperation;
- to support Ukrainian efforts to consolidate its democracy, to develop its economy and to complete the transition into a market economy."

The conclusion of the PCA allowed establishing a regular bilateral dialogue between Ukraine and the EU on political and sectoral levels, to introduce trade regulations based on the principles of GATT/W TO, and to determine the priorities of Ukrainian legislation

TABLE 19: CO-PUBLICATIONS WITH THE EU RESEARCHERS IN UKRAINE AND THE EU COUNTRIES[173]

Countries	Total number (Thomson Reuters; 2007) [1]	Part of publications in the world flow, % (Thomson Reuters; 2007) [1]	Total number (Scirus; 2010) [2]	Number of co-publications with the EU (Scirus; 2010) [2]	Top-groups
UKRAINE	1,847[174]	0.2	1,542	942	-
rmany	44,408	5.9	66,669	193	Top 10 25 and more publications
Poland	7,136	0.9	10,404	145	
France	30,740	4.1	57,017	102	
United Kingdom	47,121	6.2	82,663	80	
Italy	26,544	3.5	46,357	67	
Spain	20,981	2.8	35,178	48	
Czech	3,689	0.5	5,752	39	
Sweden	9,914	1.3	16,575	30	
Austria	4,825	0.6	8,763	26	
Netherlands	14,210	1.9	29,393	25	
Belgium	7,071	0.9	13,611	24	Top 10+9 More than 10 publications
Bulgaria	801	0.1	1,270	21	
Finland	4,989	0.7	7,798	21	
Greece	4,980	0.7	9,456	18	
Ireland	2,487	0.3	6,440	15	
Slovakia	971	0.1	1,024	15	
Denmark	5,236	0.7	10,621	11	
Lithuania	456	< 0.1	648	11	
Slovenia	1,280	0.2	1,796	11	
Hungary	2,452	0.3	3,818	8	Less than 10 publications
Portugal	3,424	0.5	7,287	8	
Romania	1,252	0.2	2,541	8	
Estonia	502	< 0.1	878	7	
Latvia	147	0.0	225	5	
Luxembourg	73	0.0	377	3	
Cyprus	139	0.0	468	1	
Malta	23	0.0	119	0	
European Union countries	**245,852**	**32.4**	**427,148**	**-**	**-**
Other countries	**758,142**	**100.0**	**-**	**-**	**-**

Reference: [1] "Science and Engineering Indicators 2010". - National Science Foundation (USA). According to Thomson Reuters (SCI, SSCI).
[2] G.M. Dobrov Centre for Scientific and Technological Potential and Scientific Studies (STEPS Centre) of the National Academy of Sciences of Ukraine. Search done using Scirus; done on 07-11.07.2011.

[173] G.M. Dobrov Centre for Scientific and Technological Potential and Scientific Studies of the National Academy of Sciences of Ukraine
[174] 39th position within 212 countries

adaptation to European standards (acquis communautaire) in main sectors of the Ukrainian economy. 7 priorities are listed in the PCA, such as: energy, trade and investments; justice and internal affairs; adaptation of Ukrainian legislation to that of the EU; environment protection; transport; cross-border cooperation; cooperation in science, technology, and space.

Based on PCA, the political dialogue between Ukraine and the EU is developing into annual meetings (Summit Ukraine/EU), with the participation of the President of Ukraine, the President of the European Council and the President of the European Commission; meetings of the Cooperation Council with the participation of the Prime Minister of Ukraine, High Representative of the EU for Foreign and Security Policy and Minister of Foreign Affairs of the country holding the rotating presidency of the EU; Committee and sectoral subcommittees responsible for cooperation between Ukraine and the EU; Parliamentary Cooperation Committee; political dialogue meetings of foreign affairs ministers; sector dialogues meetings; regular meetings on the working group level. Every year an exchange of visits on the highest and high levels takes place.

In order to foster the bilateral relations and to take into account new conditions of cooperation, particularly in the context of the 2004 enlargement, the European Union and Ukraine worked out and approved the Ukraine-EU Action Plan at the Cooperation Council meeting on 21 February 2005. It is a bilateral political document, which gives the opportunity to extend cooperation between Ukraine and the European Union, without any amendments to the existing legal basis. The Action Plan listed precise commitments of Ukraine as to the strengthening of democratic institutions, fighting corruption, structural economic reforms, and the development of cooperation with the EU in sector fields. Among the most important achievements as to the development of relations for the time of duration of the Action Plan: concession to Ukraine of a status of the country with market economy in the framework of anti-dumping legislation of the EU, the concession to Ukraine of a right to align itself with the EU declarations, the conclusion of agreements on visa facilitation and on re-admission, the extension to Ukraine of the financing provided by the European Investment Bank, deepening of sectoral cooperation, and the start of negotiations aiming at the signing of a new agreement to replace the PCA.

The Association Agenda to prepare and facilitate the implementation of the Association Agreement, which substituted the Action Plan, was adopted by the EU-Ukraine Cooperation Council on 23 November 2009, and entered into effect on 24 November 2009.

National and bilateral programmes

Below are some national and state S&T (or S&T related) programmes of Ukraine:

- National Programme of Information (started in 1998; the end year is not specified);
- National Programme of SME Support in Ukraine (started in 1998; the end year is not specified);
- National Programme "The Future of Ukraine" for 2009-2012;
- National Programme of Establishing of the National Ecology Network for 2000-2015;
- National Target S&T Space Programme of Ukraine for 2008-2012;
- State Programme on S&T Development Forecast for 2008-2012;
- State Target Programme "Science in Universities" for 2008-2012;
- State Programme "Drinking Water of Ukraine" for 2006-2020;
- State Target S&T Programme "Development and Putting into Operation Energy Saving Light-Emitting Diode Sources of Lighting and Lighting Systems Based on Them" for 2009-2013;
- State Target S&T Programme "Development and Exploitation of Microelectronic Technologies, Organisation of Manufacturing Equipment and Systems Based on Them" for 2008-2011;
- State Scientific Programme "Development of the Human Resources of Ukraine" (for 2010-2013?);
- State Scientific Programme "Economic Problems of Development of the State" (for 2010-2013?);
- State Scientific Programme "Strategic Ways of S&T Potential Development in Ukraine" (for 2010-2013?);
- State Target Social Programme "Transplantation" for 2008-2012;
- State Target Economic Programme of Power Efficiency for 2010-2015;
- State Target S&T Programme "Nanotechnologies and Nanomaterials" for 2010-2014;
- State Target S&T Programme "Development and Putting into Operation of GRID Technologies" for 2009-2013;
- State Target S&T Programme on Manufacturing of Medical Facilities for 2009-2013;
- State Target Programme "Diabetes" for 2009-2013;

- State Target Economic Programme "Nuclear Fuel of Ukraine" for 2009-2013.
- State Target Ecological Programme On Developing Secure Conditions at the Uranium Objects of the Production Enterprise "Pre-Dnipro Chemical Plant" for 2010-2014;
- State Target Ecological Programme On Monitoring of Natural Habitat for 2008-2012;
- State Target Programme on Closing Production and Use of the Ozone Depleting Substances for 2004-2030;
- State Target Programme on Utilisation of the Liquid Missile Fuel for 2010-2014;
- State Target Programme "Forests of Ukraine" for 2010-2015;
- State Target Economic Programme "Creation of Innovative Infrastructure in Ukraine" for 2009-2013;
- State Target S&T Programme on Research in Antarctic for 2011-2020;
- State Target S&T Programme on Development of Sensor Knowledge-Based Products for 2008-2012;
- State Target S&T Programme "Creation of Chemical and Metallurgical Production Field of Virgin Silicon" for 2009-2012;
- Target Complex Programme "Basics of Genomics and Proteomics" for 2007-2011;
- Inter-branch Complex Programme "Health of the Nation" for 2002-2011.

EU Framework Programme for Research and Technological Development

The National Information Centre for Ukraine-EU S&T Cooperation (NIP Ukraine) was established on 01 August 2003 to support integration of the Ukrainian scientific community into the ERA by facilitating access of the scientific community of the country to the European Community research through the National Information Points Network. NIP Ukraine has set up a network of regional contact points to coordinate their activities.

For the period from March 2005 till December 2006, NIP Ukraine had served as the INTAS Helpdesk in Ukraine.

NIP Ukraine has a positive experience in implementing and coordinating international academic and scientific activities as well as disseminating S&T-related information and signposting up to date information to authorised bodies and institutions within scientific networks. Besides, it has good partnership relations with the institutions of the National Academy of Sciences of Ukraine, the branch-oriented research institutions of the Ministry of Industrial Policy of Ukraine and specific agencies, like the National Aerospace Agency of Ukraine, with which it has concluded cooperative agreements. NIP Ukraine runs the general information services on FP procedures and requirements, networking with educational and research institutions, as well as providing partner-search assistance to Ukrainian potential FP participants. More specific activities include: organisation and conducting specialised conferences, workshops and seminars for target groups, training and consulting potential FP project participants, publishing information bulletins on FP, and issuing guides on FP rules, procedures and requirements. NIP Ukraine is INCO NCP, as well as serving as NCP in other areas including ICT and as a contact point for the FP7 priorities before the NCP system was established in Ukraine.

NIP Ukraine is a partner in the following FP6 and FP7 projects: "Support for participants in ICT priority by network for IST under the transition to the 7th Framework Programme –Idealist7fp", "Scenarios for a co-ordinated approach to sustainable S&T cooperation with the Eastern neighbours of the EU – SCOPE-EAST", "Strengthening co-operation between the European Research Area and NIS – ERANIS", "Promoting International Cooperation for Environmental Research Through Dissemination and Networking Activities - INT-ER-LINK", "S&T International Cooperation Network for Eastern European and Central Asian Countries – IncoNet EECA", "Extending ICT research cooperation between the European Union, Eastern Europe and the Southern Caucasus – EXTEND" and "Enhancing the bilateral S&T Partnership with Ukraine – BILAT-UKR". NIP Ukraine is the national expert for Ukraine within the FP7 project "Trans-national cooperation among ICT NCP – Idealist 2011".

NIP Ukraine has been nominated as NCP INCO, Mobility and Legal and Finance of FP7. Along with NIP Ukraine, other institutions nominated as thematic NCPs by the Ministry of Education and Science, Youth and Sports of Ukraine, the State Agency of Ukraine on Science, Innovations and Information, the National Academy of Sciences of Ukraine and the National Space Agency of Ukraine make the NCP network in the country.

As for the beginning of 2011, Ukraine's participation in the EU Seventh Framework Programme for Research and Development is as follows: number of project proposals – 740; mainlisted projects – 150; total budget of the supported projects (not of the Ukrainian teams) is almost €12 billion.

In comparison to Ukraine's participation in the first years of FP7 and its participation in FP6, the number of project proposals has risen by 79% and the number of mainlisted projects by 64%.

European Neighbourhood Policy Instrument (ENPI)

The European Commission and the High Representative of the Union for Foreign Affairs and Security Policy published the annual "neighbourhood package" on 25 May 2011, which consists of a communication proposing a reviewed European Neighbourhood Policy (ENP), 12 country reports on developments in 2010, including one on Ukraine, as well as a sector report and a report on the Eastern Partnership. The report contains the S&T related component (Section 6: Transport, Energy, Environment, the Information Society, Research and Development) which reads as follows:

"Ukraine continued to update its research and innovation policy with more direct and sustainable economic development objectives. Ukraine's participation in the 7th Research Framework Programme (FP7) continued to be encouraging with an increased number of successful proposals in 2010. As of November, 91 Ukrainian research entities were involved in successful FP7 research projects, receiving an EU contribution of €8.08 million. The possibility to associate Ukraine to FP7 is being explored. The ongoing bilateral 'Bilat-UKR' project organised various seminars and workshops supporting Ukraine's participation in FP7.

As part of this project, analysis has been carried out on the issues of scientists' mobility, research infrastructures and innovation as a basis fostering EU-Ukraine collaboration in these areas. The EU-Ukraine Science and Technology (S&T) cooperation agreement is in the final stages of being renewed for a further period of five years.

Ukraine continued to participate actively in the International Science & Technology Cooperation Network for Eastern European and Central Asian countries (FP7 IncoNet EECA project), which aims to support a bi-regional EU-EECA policy dialogue on science and technology and to increase EECA participation in FP7. In October 2010, an IncoNet Brokerage Event for the FP7 energy theme was organised in Kyiv by the FP7 National Information Centre.

Ukraine took an active part in the Black Sea ERA-NET project which aims to help coordinate national research programmes (from EU member states and partner countries) targeting the Black Sea region as a whole. The project consortium for the Black Sea ERA-NET project recently launched a first joint call for proposals to promote collaborative research on innovative approaches to sustainable development in the region."[175]

Lifelong Learning Programme (LLP)

Erasmus Mundus Programme was launched in Ukraine in the current shape in 2004.

Action 1: Erasmus Mundus Joint Courses and Doctorates

158 students and 35 scholars have been awarded grants within Action 1 of the Programme.

In 2009/2010 academic year, 36 Ukrainians were awarded grants. In 2010/2011 academic year, 28 Ukrainian students and scientists were awarded grants, 104 are on the reserve list and 156 are not selected. The total number of applications is 288.

Action 2: Erasmus Mundus Partnership

98 mobility grants were awarded in 2009 and 100 in 2010. The partners of the mobility consortia on the Ukrainian side are the following universities:

- Taras Shevchenko National University of Kyiv;
- Dnipropetrovs'k National University;
- Kharkiv National Academy of Municipal Economy;
- Bogomolets National Medical University;
- Ivan Franko National University of L'viv;
- Taurida National V.I. Vernadsky University.

Action 3: Information Grants for Erasmus Mundus National Structures

Unfortunately, no information on Ukraine's participation in Action 3 could be found.

Ukraine joined ***TEMPUS*** on 29 April 1993. At that period the programme focused on improvements of university governance and management, upgrading old curricula and developing new courses and programmes, professional development of teachers, especially in such disciplines as economics, foreign languages, social science, European studies, and law. Ukrainian higher education institutions actively participated in the TEMPUS programme from the very beginning. Therefore, it is only reasonable that cur-

rently TEMPUS projects are being implemented in most regions of Ukraine. Over that period, Ukrainian universities have demonstrated their commitment to reforms and strong dedication to the development of higher education, introduction of innovative approaches and state-of-the-art technologies in the educational field.

During the third phase of the TEMPUS programme in 2000-2006, the focal point has been shifted towards new priorities and new disciplines. Ukraine's participation in the TEMPUS III programme coincided with its aspirations to join the European Higher Education Area in line with the Bologna process, which was reflected in the projects. As to the list of priority disciplines for that period of time, it included, in addition to economics and business management, agrarian science, ICT, and environment.

Starting from 2000, participation in the TEMPUS projects is broadened beyond higher education institutions and is opened to companies, non-governmental and non-profit organisations and authorities. Accordingly, among participants of the TEMPUS projects in Ukraine, we can find the Secretariat of the Cabinet of Ministers of Ukraine, Ministries of Education and Science, Environmental Protection, Agricultural Policy, regional state administrations, municipalities, entrepreneurs' associations and students' unions, agricultural companies, ports, and research institutes.

Currently, the priorities and directions of the TEMPUS programme in Ukraine are directly linked to the advancement of the Bologna process.
As a consequence of the TEMPUS projects, new courses and curricula were developed that meet the current requirements of the Ukrainian labour market. University teachers confirm that cooperation with European colleagues within the TEMPUS project enabled them to obtain new knowledge, master new teaching skills and evaluation techniques, which resulted in a greater competitiveness of their universities, and improved their status and standing.

On the whole, the TEMPUS programme facilitated internationalisation of Ukrainian universities, helped to establish long-term partnerships between them and their European counterparts that did not stop after the project's completion, and assisted with initiation of new research projects or exchange programmes. On many occasions, TEMPUS projects helped to set up a dialogue between higher education institutions and the public authority in charge or its regional branches; between faculty and administration; between employers, teachers and students.

Within the framework of the TEMPUS I, II, III programmes from 1993 to 2006, about TEMPUS projects were implemented in Ukraine.

Three calls for proposals of Tempus IV resulted in 28 projects with the Ukrainian HEI participation: 25 projects JP (Joint Projects) and 3 structural measures, 23 multi-country and 5 national projects are among them. The list of all projects can be found at:

http://eacea.ec.europa.eu/tempus/results_compendia/projects_description_en.php

Within the framework of the TEMPUS I, II, III stages from 1993 to 2006, generally 299 TEMPUS projects had been approved for Ukraine, with the overall funding of €53.6 million: JEPs: 110; Pre-JEPs: 47; CPs: 14; IMGs: 100; SCMs: 28.

1st call for proposals of the Tempus IV project with the participation of Ukrainian universities: 12 projects JP (Joint Projects) have been implemented since February 2009.

2nd call for proposals of the Tempus IV project with the participation of Ukrainian universities: 12 projects JP (preliminary budget is €9 million).

3rd call for proposals of the Tempus IV project with the participation of Ukrainian universities: 5 projects JP. Tempus project "Improvement of education in the field of environmental management" (Grant Agreement Nr 144746-TEMPUS-2008-RU-JPCR) started on the 15 January 2009. Project duration is 3 years, total budget – 1,133,460 Euros, including EC grant – 1,080,489 Euros. Consortium consists of 13 partners from 9 countries: five EU-member states and four Partner-countries[176]. Coordinator of the project is Saint-Petersburg State University in Russia. Ukrainian partners are V. N. Karazin Kharkiv National University (KKNU), Taurida National V. I. Vernadsky University (TNU), the Ukrainian scientific and Research Institute of Ecological Problems, and ETB-Technology Trade Ltd.

In the framework of the Tempus project from 11-17 April 2011, Prof. John Kiousopoulos (Spatial Analysis Laboratory, Technological Educational Institute of Athens, Greece) visited V. N. Karazin Kharkiv National University. The key aim of the visit was reading lectures on the topic "Spatial Planning in Hellas, Legislation & Milestones [with References in E. U.]" for students and teachers of the School of Ecology.

Also during Prof. John Kiousopoulos's visit on 14 April 2011, an official opening of the classroom for interactive learning was organised. Prof. Zarif F. Nazirov (Vice-President for International Cooperation (Research and Education), KKNU) launched it. The creation of the classroom is one of the key project outputs. Representatives from the School of Ecology and other schools as well as Tempus project partners were present on the ceremony. An internet-conference with a team of Taurida National V. I. Vernadsky University was carried out; during the conference partners exchanged their opinions concerning the project progress, but also the equipment and the distance learning system were checked. The classroom will be used in the educational process for on-line lectures, internet-conferences, and other events, demanding special equipment and software.

Challenges

Ukraine has adopted several laws which outline specific strategic challenges, in particular the Laws of Ukraine "On Priorities of Science and Technology Development" and "On Priorities in Innovation Activities in Ukraine" and the Resolution of the Cabinet of Ministers of Ukraine "On Approval of the List of Priority Thematic Directions of Scientific Research and Science and Technology Designs for the period up to 2015".
As regards S&T cooperation between Ukraine and the European Union, a major element of its full realisation is implemented through both, the EU Framework Programme and numerous bi-/multilateral S&T cooperation programmes and activities of the EU Member States with participation of Ukraine. Concerning an increase of direct science and technology cooperation activities, it is necessary to further foster Ukrainian participation within the framework of those programmes. Several steps towards this goal have been already initiated on the state level, like creation of the Ministry of Education and Science, Youth and Sports of Ukraine based on the Ministry of Education and Science of Ukraine, establishment of the State Agency of Ukraine on Science, Innovations and "Informatisation" and development of the NCP network in Ukraine (nomination of thematic NCPs).

Organisational changes and distribution of S&T functions between the executive authorities may: a) assist in raising awareness in the EU of the Ukrainian science and technology and innovation activities, b) solve the problems of funding mechanisms within the field, c) foster development of scientific infrastructure. The outcome of the process could be manifold: the Ukrainian researchers participate in more international S&T projects, gain more experience, including collaborative team work experience, etc.

Better involvement of young scientists and researchers in the international S&T projects, as an addition to the state programmes, may prevent a drain brain and increase their motivation to carry out science and research, both on national and international level. It should also refer to other (more experienced) groups of the scientific community. The Ukrainian Government takes measures to cope with the situation via corresponding national programmes.

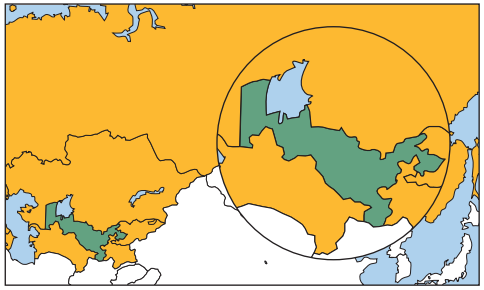
According to the Ukrainian economists, the pace of creating innovative infrastructure does not meet today's demands. The key problem to implement the innovative model of Ukraine's development is a discontinuity between the phases of scientific research and putting innovation in operation due to lack of effective mechanism of transformation of scientific knowledge into innovative ideas which can be used in economy.[177]

Also the experts related to the field discuss a better involvement of the research diaspora to strengthen the S&T dialogue between Ukraine and the EU.
The legal and financial component is considered as one of the most important, in particular as regards implementation of the international science and technology projects.

[175] www.ec.europa.eu/world/enp/pdf/progress2011/sec_11_646_en.pdf

[176] www.stepscenter.ho.ua/Zv1.pdf

I.12 Country Report Uzbekistan



Current State of S&T & Major Policy Challenges

S&T Indicators

TABLE 20: S&T LANDSCAPE 2010[178]

R&D Expenditure as % of GDP	Number of research organisations	Number of researchers
0.20	202	34,587

Research Structure and Policy

Uzbekistan has the following Decrees and Laws related to science:

1. Decree of the Cabinet of Ministers, Republic of Uzbekistan #31 of 19/01/1998 "On state support of international scientific programmes, projects in the framework of international and foreign grants".
2. The Decree of the President of the Republic of Uzbekistan #436 of 07/08/2006 "On measures for the further development of coordination and management of science and technology".
3. Law of the Republic of Uzbekistan "On invention" (on discussion).
4. Law of the Republic of Uzbekistan "On protection of intellectual rights" (on discussion).

Science, technology, and innovation policy in Uzbekistan directed to the increase of science and technology contribution to the development of the country's economy, supply of progressive structural and technological reforms in material production, strengthening economic independence and national consciousness, assistance of citizen's spiritual and harmonious development, strengthening interrelation of science, education, and industry.

S&T and Innovation activity in the republic regulating in accordance with the Decree of the President of the Republic of Uzbekistan #436 of 07/08/2006 "On measures for the further development of coordination and management of science and the technological development". In the republic, 7 national priority fields of science and technology development have arisen, which are subject to the socio-economic development of the country. These are the following: Socio-economic policy;

- Spiritual-moral and historical-cultural development of the society;
- Science-intensive technologies and development of high effective methods of finding, mining operations and deep processing of mineral raw and secondary resources;
- Earth, water resources, biodiversity, agro-industrial complex, food;
- Health and ecological safety;
- Information and communication technologies;
- Education[179].

Important Research Organisation

The Research complex of Uzbekistan includes 361 institutions in academic, higher education, medical, agricultural spheres (202 research institutes, 62 universities, 65 design organisations, 32 scientific & production associations and experimental enterprises).

The Academy of Science, the Ministry of Higher and Secondary Specialized Education, the Ministry of Agriculture and Water Resources and the Ministry of Healthcare of Uzbekistan are the main ministries, which have the biggest R&D infrastructures. The main task of the Uzbekistan Academy of Science is to solve main fundamental and applied scientific problems of the country's economy.

The Academy has 50 research institutes in all fields of modern science & technologies, including physics, chemistry, biology, earth sciences, material sciences, information technologies, social sciences, humanities, etc. Having 12 research institutes, the Scientific & Production Association of Agriculture under the Ministry of Agriculture and Water Resources has the biggest R&D infrastructure of Uzbekistan in the field of agriculture. Researches carried out in the Association are directed to solve main S&T problems in agricultural industry (breeding of new varieties of cotton and other industrial crops, resistance of plants to environmental stresses, water saving technologies, new effective fertilisers, horticulture, etc.). In addition to institutes and universities reporting to mentioned ministries, there are another 143 ones, belonging to other ministries and independent entities, which also have rather big research potential (approx. 25%). Coordination and financing of R&D activities of these entities are executed directly by the CCSTD and these researches cover, practically, all priority fields in S&T[180].

Current trends & Challenges in International Cooperation

National Policies

The Presidential Decree of 20 February 2002 No PD 3029 "Improvement of the organisation of the scientific-technical activity" Regulation of the Cabinet of Ministers of the Republic of Uzbekistan of 19 January 1998 "State support for the development of international scientific-technical relations, scientific programmes and projects by grants of international and foreign organisations and funds"[181].

Bilateral Agreements

The Republic of Uzbekistan has signed 42 bilateral agreements on S&T cooperation on high governmental level. Among them, 9 are between Uzbekistan and EU MS (i.e. Hungary, France, Czech Republic, Latvia, Lithuania, Poland, Italy, Germany, Bulgaria). Bilateral agreements have also been concluded between the Committee for Coordination of Science and Technology Development under the Cabinet of Ministers, the Uzbek Academy of Sciences, Research Institutes of the Uzbek Academy of Sciences and the ministries. For example: Agreement between the Committee for Coordination of Science and Technological Development and the Ministry of Economy of Korea, the Russian Fund on Fundamental Researches, the Department on Science and Technology of India, the CRDF Fund, the Agreement between the State Educational Institute of High Professional Education State University of Kostroma named after Nekrasov, and the Uzbek Scientific Research Institute of Pedagogical Science, named after Kari Niyazov, the Agreement between the Xinjiang Technical Institute of Physics and Chemistry and the Institute of Plant Substances Chemistry of Uzbek Academy of Sciences, the Agreement between the Institute of Bioorganic Chemistry of the Uzbek Academy of Sciences and the Shanghai Institute of Medical Materials, the Memorandum between the Korean Institute of Electronic Technology and the SPC "Physics Sun" of the Uzbek Academy of Sciences, the Memorandum between the Institute of Automatics and Electronics of the Uzbek Academy of Sciences and the Korean Institute of Economics of Energetic, the Agreement between the Uzbek Academy of Sciences and the National Centre of Scientific Researches of France (CNRS), the Agreement between the Uzbek Academy of Sciences and the Polish Academy of Sciences, and others. Partnership links have been established with ministries and agencies of most EU countries and a number of international S&T foundations. Cooperation with EECA-countries is carried out within the framework of bilateral and multilateral S&T programmes. For example, in 2007 two collaborative calls for joint fundamental research projects have been organised in the framework of the programmes "Uzbekistan-Russia'2008" and "Uzbekistan –Ukraine'2008".

On the basis of the results achieved by realised projects under the programme of "Uzbekistan-Russia' 2008", fundamental research projects scientists and specialists of Uzbekistan and the Russian Federation carried out fundamental research within the framework of 22 joint projects on perspective priorities of modern science such as solid-state physics and elementary particles, microelectronics, mathematics, astronomy, biology and biophysics, genetics, bioorganic chemistry, advanced materials, power, laser technologies, geology and seismology, and medicine.

By the bilateral international programme of "Uzbekistan –Korea'2008" research projects and 3 joint scientific and research projects were carried out in the field of biotechnology, physics and material

[178] Committee for Coordination of Science and Technology Development
[179] Committee for Coordination of Science and Technology Development
[180] Uzbekistan Country report
[181] www.mfa.uz/rus/dokumenti/

sciences by scientists and specialists of the Institute of Material Sciences SPO "Physics-Sun", and Donets Physical and Technical Institute NAS Ukraine. 5 joint research projects have been applied in the field of new materials and components within the framework of the bilateral international programme "Uzbekistan-Korea' 2010". These research projects have been carried out since 2010. The call of "Uzbekistan-CRDF' 2010" fundamental research projects has been announced in the field of improvement of ground and water resources use in collaboration with the American Fund of Civil Researches and Development (CRDF) in June 2010.

In addition to this, the Uzbek scientists and specialists actively participated in the multilateral international research programmes in 2009. It allowed to spend 7,402,300 US dollars for the realisation of 59 international research projects for the support of scientific potential of the Republic of Uzbekistan. Grants in the amount of 1,057,445 US dollars for the realisation of 12 scientific projects are received under the programmes of the Scientific Committee of the NATO (NATO), 6 grants in the amount of 1,530,169 US dollars under the programmes STCU, 9 grants in the amount of 1,228,899 US dollars under the programmes CRDF, 5 projects in the amount of €341,000 (443,300 US dollars) under the programmes of the FP7 EU and 27 grants in the amount of 3,142,487 US dollars under other international programmes.

Regional Network/Cooperation

The main collaboration partners with Uzbekistan are South Korea, USA, Europe, Russia, and Germany.

According to the ISI database Uzbekistan scientists have published 3,944 SCI articles and 55 SSCI and AHCI articles from 1997-2007. The average number of international publications produced by Uzbekistan researchers per million inhabitants was 12.9 in 2007. The average number of publications related to its GDP was 5.8 in 2007.

During the studied period the published articles have been to a large extent – 29.4% - in the field of physics and astronomy. Quite an important share of articles is also in the fields of chemistry (10.6%), shortly followed by mathematics (8.85%) and engineering (8.1%).

However, in the past years the excellence areas may have changed slightly. Thus, according to the Science Citation Index (SCI) in 2008, the clear priority field was organic chemistry while that of SSCI and A&HCI were economics and public, environmental and occupational health.

The articles with Uzbek participation had co-authors from 85 countries, which is the fourth highest number among EECA countries. The selected 15 countries constitute 72.7%[182].

EU - Central Asia Strategy

The EU's aim in Central Asia, supported by the European Commission, is to promote the stability and security of the countries in Central Asia, to assist in their pursuit of sustainable economic development, to raise living standards, and to facilitate closer regional cooperation – both within Central Asia and between Central Asia and the EU – in a comprehensive manner, including individual bilateral relations between the EU and the five Central Asian countries.

The European Commission is currently implementing projects in the fields of maternal care (Mother and Child Project), enhancing living standards, social services (Institutional Building and Partnership Programme), and private sector development (Central Asia Invest Regional Programme).

Important new programmes are currently being designed in the institutional and legal framework areas, such as "Support for the Uzbek Parliamentary System" and for the implementation of judicial reforms and criminal laws. Between 2011 and 2013, cooperation will target three main areas: raising living standards through rural and local development, rule of law and justice reform, and enhancing trade, business, and SMEs. The European Commission is also supporting cooperation in the fields of renewable energy and energy efficiency, education, environment, border management, and the fight against drugs[183].

Partnership and Cooperation Agreements (PCAs)

The beginning of the relations with the European Union, uniting 15 countries of Europe, is marked by the signing of the Memorandum of Mutual Understanding between the Government of the Republic of Uzbekistan and the Commission of the European communities (CEC) on 15 April 1992. On 16 November 1994, diplomatic relations were established.

[182] 5.6 EU EECA_ ST Cooperation

[183] www.ec.europa.eu/europeaid/where/asia/country-cooperation/uzbekistan/projects_en.htm

In January 1995, the dip-mission of Uzbekistan at the CEC started in Brussels. On 1 August 2002, the "House of Europe" (representation CAS on rendering technical assistance) began its work in Tashkent. It is an intermediate link in the establishment of an EU delegation in Uzbekistan.

The Partnership and Cooperation Agreement (PCA) with Uzbekistan signed in April 1996 has been the basis for EU-Uzbek bilateral relations since it entered into force in1999.

The future EC assistance will focus on the following priority areas: promotion of human rights and democratisation, strengthening civil society, rule of law, legal reforms and good governance, rural and local development.

EU Framework Programme for Research and Technological Development

Uzbekistan National Information Point (NIP) for EU Framework Programmes was established in 1995. It is a non-profit organisation. ***Indo-Uzbek Centre for Promotion S&T Cooperation (IUCP-T)*** was created under the law of Uzbekistan (Registration number 196 from 27 July 1995) by the State Committee on Science and Technology of the Republic of Uzbekistan in order to render purpose-directed promotion to scientific institutions and organisations of Uzbekistan.

17 Uzbek research organisations participated in the FP6 projects, of which the great majority falls under the activity "Specific Measures in the Support of International Cooperation". 3 projects were also funded under the thematic area "Sustainable Development, Global Change, and Ecosystems". For the exact division of the 17 Uzbekistan teams' participation in the projects by thematic areas, see below.

By now, there are eight Uzbek research groups participating in the ***FP7*** projects with funds of more than 354,000 Euros. One of them participated in a project in the priority area of "Food, Agriculture, and Biotechnologies" and another in "International Cooperation"[184].

1. Project ***„IncoNet EECA"*** has ***INDO Uzbek Centre on Promotion of Science and Technical Cooperation Assocation IUCP T*** in Tashkent as its partner. The project is coordinated by the International Centre for Black Sea Studies in Greece.
2. Project ***"IRENE"*** has ***National University of Uzbekistan named after Mirzo Ulugbek*** in Tashkent as its partner. The project is coordinated by Universita Degli studi di Trieste.
3. Project ***"EECALINK"*** has ***INDO Uzbek Centre on Promotion of Science and Technical Cooperation Assocation IUCP T*** in Tashkent as its partner. The project is coordinated by the Karlova University in Prague.
4. Project ***"SEOCA"*** has three organisations from Uzbekistan as following: The State Enterprise Centre of Remote Sensing and GIS Technologies, Hydrometereological Research Institute of Uzhydromet and Tashkent State Technical University named after Abu Raikhman Beruni. The project is coordinated by the Technical University in Berlin.
5. Project ***IncoNet CA/SC*** has ***INDO Uzbek Centre on Promotion of Science and Technical Cooperation Assocation IUCP T*** in Tashkent as its partner. The project is coordinated by International Centre for Black Sea Studies in Greece.
6. Project of Marie Curie "The origin of excess charge at water/hydrophobic interfaces" at the Heat Physics Department of Uzbekistan Academy of Sciences for the period 2010-2012.
7. Project of Marie Curie "Spectral properties of molecular clusters confined helium nanodroplers" at the Heat Physics Department of Uzbekistan Academy of Sciences for the period 2011-2012.

Development Cooperation Instrument (DCI)

The overall EU cooperation objectives, policy responses, and priority fields for CA can be found in the EC Regional Strategy Paper for Central Asia 2007-2013 and the Central Asia Indicative Programme 2007-2010 . In addition to the assistance under the Development Cooperation Instrument (DCI), Uzbekistan participates in ongoing regional programmes.

At national level, 77 projects on a total sum of €125.8 million (today realised 4 projects on a total sum of €7.3 million) were carried out through cooperation with the EU (1992-2002) on a TASIS line in Uzbekistan. Within the framework of the interstate and national TASIS programs, more than 200 projects have been carried out in a 10-year-period, with a total sum about €440 million. 25 projects of a total sum of more than €60 million have been realised. Uzbekistan is the second trading partner of the EU in the region after

[184] D5.6 EU EECA_ ST Cooperation

Kazakhstan. In 2003, the EU imported goods from Uzbekistan for €600 million, and exported goods worth of €400 million to the country. This is over four times higher than Uzbekistan's trade with the US. Imports from Uzbekistan mainly consisted of agricultural products and textiles, and EU's main export products were machinery and chemical products.

Uzbekistan holds a WTO Observer Status, for which it applied in 1994. The Working Party on the accession of Uzbekistan was established on 21 December 1994. Uzbekistan submitted its Memorandum on the Foreign Trade Regime in October 1998 and a first meeting of the Working Party was held in July 2002. Uzbekistan began bilateral market access negotiations with interested members on the basis of initial offers in goods and services circulated in September 2005. The third meeting of the Working Party took place in October 2005.

The European Union is one of the major trade-economic partners of Uzbekistan. For 2002, the commodity circulation of the Republic with the EU states has reached 833.1 million US dollars, whereas export has made 392.1 million US dollars and import 440.9 million US dollars.

The greatest portion of the Uzbek export in 2002 was to Great Britain (51.03% of all exports to the EU), in the second place to Italy (24.43%). It is necessary to note that in 2001 these two countries were the largest importers of Uzbek goods among the EU countries. The lowest volume of export of Uzbek production is registered with Denmark, Ireland, Luxembourg, Finland, and Sweden (less than 1%).

The basic part of the Uzbek import from the EU for 2002 was from Germany (45.94% out of total import from the EU), Italy was marked second (17.4%). At the same time in 2001 the basic share of Uzbek imports from the EU came from Germany (43.52%) and France (22.73%). The analysis of the export structure of Uzbekistan to the EU-countries in the last years shows that the trade-classification structure of export of Uzbekistan consists, as a rule, of a small number of positions with prevalence of raw goods, while the structure of the import from the EU includes more positions, basically submitted by the process equipment[185].

Several forthcoming projects on DCI will have a technology component as part of their activities:

- Rural development: new European technologies in fruit and vegetable processing, horticulture, etc.; fields of intervention currently under discussion with MoE and MFERIT;
- Support to Bicameral Parliament: electronic network connecting two chambers of Oliy Majlis, regional kengashes, and Jogorky Kenes;
- Criminal Justice Reform: central electronic criminal database accessible to all law enforcement agencies.

Several regional and national projects will concentrate on new technologies in the energy sector: energy saving, prevention of gas leakages, renewable energy etc.[186]

Lifelong Learning Programme (LLP)

Uzbekistan does not participate in programmes such as Comenius, Erasmus, Leonardo da Vinci, or Grundtvig. Recently, there are 7 ongoing TEMPUS projects in Uzbekistan. In the Erasmus Mundus programme there are 5 projects. These are as follows: TARGET, MANECA, TOSCA, CENTAURI, AND CASIA.

In Uzbekistan, Tempus has had a considerable impact on the overall ***internationalisation process of higher education,*** being the only programme providing long-term intensive inter-university cooperation and improving the universities' technical infrastructure and computer facilities. Most foreign support in Uzbekistan goes to secondary specialised vocational education, which is at the core of the National Programme for Personnel Training (NPPT).

European Projects for curriculum development were especially important because of their direct links to the NPPT, and in particular with the introduction of the two-level higher education system.

In recent years, Tempus projects have ***supported the development of new curricula and courses*** for Masters' and Bachelors` programmes, mainly in the fields of engineering and applied technologies, ensuring their relevance to the local labour market needs through direct involvement of enterprises, branch ministries, Chamber of Commerce and Industry, and other non-academic organisations[187].

[185] www.trade.ec.europa.eu/doclib/docs/2008/october/tradoc_141165.pdf
[186] Information from Europe House of Uzbekistan

Challenges

Science in Uzbekistan has a long history, particularly in astronomy, mathematics, medicine, and philosophy. Uzbekistan is home to Ulugh Beg, for example, the only astronomer ever to rule a mighty state. It was Ulugh Beg, who built the enormous observatory in Samarkand in 1420. Even today, the country has the third biggest pool of researchers among CIS countries after the Russian Federation and the Ukraine: 26,000. Only one out of ten researchers (2,421) works for the Academy of Sciences.

Once the seven priority areas for R&D had been established, scientific institutions and universities were invited to develop 17 broad research programmes for the period 2008–2018. In parallel, the committee consulted the Academy of Sciences and ministries and agencies responsible for the economic development, on which system of competitive bidding to adopt for the selection of research proposals submitted by scientific institutions and universities in areas corresponding to the seven national priorities in R&D. A first round of the selection process took place in 2007 for projects in basic research and a second round in 2008 for projects in applied research and experimental development. Eight basic research programmes consisting of 417 projects were adopted for implementation during 2007–2011. A further 17 programmes consisting of 591 projects in applied research are being implemented during 2009–2011. Eight programmes consisting of 172 projects in experimental development were implemented in 2009 and 2010. As the national budget for research is very low – just 0.20% of the GDP in 2010, according to estimates – government funding of selected projects is complemented by foreign and private investment representing 25–30% of the GERD.

The quota for funding allocated to each research programme is fixed by the committee together with the Ministry of Finance. The state budget is assigned by the Ministry of Finance directly to the 'customers' who are responsible for each R&D programme or project. These customers may be the Academy of Sciences, the Ministry of Higher Education and the Secondary Specialised Education, the Ministry of Public Health, the Ministry of Agriculture and Water Resources, the Ministry of Public Education, or other ministries, leading research centres, and other agencies and organisations. It is the committee which monitors the implementation of R&D programmes and projects. In 2006–2008, it was reported that R&D programmes and projects had led to 166 patents. During this period, the number of articles published in international journals in the field of basic research corresponds to the number of articles about applied research. 0.19% of the scientific articles worldwide were contributed by Uzbek scientists compared to 0.02% contributed by Kazakhstan.

[187] Information from Europe House of Uzbekistan

II Annex – Links to European Websites

Information about the European Research Area (ERA):
www.ec.europa.eu/research/era/index_en.htm

European Commission Directorate-General for Research and Innovation:
www.ec.europa.eu/research/index.cfm

European Parliament - Committee on Industry, Research and Energy (ITRE):
www.europarl.europa.eu/activities/committees/homeCom.do?language=EN&body=ITRE

EU - Community Research and Development Information Service (CORDIS):
www.cordis.europa.eu/home_en.html

Information about FP7:
www.cordis.europa.eu/fp7/home_en.html

FP7 partner search Database:
www.cordis.europa.eu/partners/web/guest/home

Participant Portal:
http://ec.europa.eu/research/participants/portal/page/home

National R&D and innovation information services:
www.cordis.europa.eu/national_service/home_en.html

Monitoring RTDI in European countries:
www.erawatch.jrc.ec.europa.eu

EUROPA INCO Service - Information regarding EU international cooperation in the field of research:
www.ec.europa.eu/research/iscp/index.cfm

Strategic European Framework for International Science and Technology (S&T) Cooperation (SFICI):
www.ec.europa.eu/research/iscp/index.cfm?lg=en&pg=strategy

INCO-NET EECA – S&T International Cooperation Network for Eastern Europe and Central Asian Countries: www.inco-eeca.net

INCO-NET SC/CA – S&T International Cooperation Network for Central Asian and South Caucasus Countries: www.inco-casc.net

INCREAST – Information Exchange in Science and Technology between the European Research Area and Eastern Europe/Central Asia/South Caucasus
www.increast.eu

Platform on ERA-Nets & transnational R&D programme collaboration (netwatch):
www.netwatch.jrc.ec.europa.eu/nw/index.cfm/info/Nets

European Technology Platforms (ETPs):
www.cordis.europa.eu/technology-platforms/home_en.html

European Research Council (ERC) – reports, statistics, policy documents:
www.erc.europa.eu

Strategic European Framework for Research Infrastructures (ESFRI):
www.ec.europa.eu/research/infrastructures/index_en.cfm?pg=esfri

European Commission – Joint Research Centre:
www.ec.europa.eu/dgs/jrc/index.cfm

European Institute of Innovation and Technology (EIT):
www.eit.europa.eu

European Commission – Research Executive Agency (REA):
www.ec.europa.eu/research/rea

Information about EU's Competitiveness and Innovation Programme (CIP):
www.ec.europa.eu/cip/index_en.htm

Information about Intellectual property and technology transfer:
www.ec.europa.eu/invest-in-research/policy/ipr_en.htm

Information about the EC development cooperation for ENPI countries (European Neighbourhood Countries):
www.enpi-programming.eu/wcm/index.php

Development Cooperation Instrument of the EU (e.g. for Central Asian Countries):
www.ec.europa.eu/europeaid/how/finance/dci_en.htm

Information about TEMPUS to modernise higher education in the EU neighbourhood
www.ec.europa.eu/education/external-relation-programmes/doc70_en.htm

Information about ERASMUS MUNDUS (scholarships and academic cooperation)
www.ec.europa.eu/education/external-relation-programmes/doc72_en.htm

European Researchers' Mobility Portal (EURAXESS):
www.ec.europa.eu/euraxess

Information regarding EU's growth strategy for the coming decade (Europe 2020):
www.ec.europa.eu/europe2020/tools/flagship-initiatives/index_en.htm

Innovation Union, turning ideas into jobs, green growth, and social progress
www.ec.europa.eu/research/innovation-union/index_en.cfm

Intergovernmental framework for European Cooperation in Science and Technology (COST):
www.cost.esf.org

EUREKA – platform for R&D-performing entrepreneurs in Europe and beyond:
www.eurekanetwork.org

Eurostars – European innovation programme managed by EUREKA:
www.eurostars-eureka.eu

European Science Foundation (ESF):
www.esf.org

Information about science and technology and research policies in Europe (EUROSCIENCE):
www.euroscience.org

IGLO – Association of non-profit R&D Liaison Offices:
www.iglortd.org

Initiative for Science in Europe (ISE):
www.initiative-science-europe.org

European Science Communication and Information Network (ESCIN):
www.esf.org/escin/default.htm

Key figures of science, technology, and innovation in the EU:
www.ec.europa.eu/invest-in-research/monitoring/statistical01_en.htm

EU statistical information service (EUROSTAT):
www.epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/

Links to EU documents, statistic, and other EU-related information:
www.europa.eu/documentation/index_en.htm

Information about Intellectual property and technology transfer:
www.ec.europa.eu/invest-in-research/policy/ipr_en.htm

Information about Business and Innovation (European Business Network):
www.enterprise-europe-network.ec.europa.eu/index_en.htm

Latest news on RTD – Magazine on European Research:
www.ec.europa.eu/research/rtdinfo/index_en.html

Information on Science, Technology, and Innovation in Europe (ScienceEurope):
www.scienceineurope.net