ERAWATCH COUNTRY REPORTS 2012: Ukraine

ERAWATCH Network – Centre for S&T Potential and Science History Studies of the National Academy of Sciences of Ukraine

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Executive Summary

Ukraine is one of the largest post-Soviet countries, which was formed in 1991 after the collapse of the USSR. The population of the country is approximately 45.71m people (2011) having the tendency to decline during the last 22 years (Ukraine had more than 52m inhabitants in 1991). GDP per capita is $7.040 (PPP, 2011)[1] and the level of R&D expenditure (GERD/GDP) was 0.75% in 2012, less than 37% of EU-27 average ratio. According to the official data for 2011, the share of GERD in GDP dropped to 0.73%, which is the lowest figure for all period of independence. The country still has substantial R&D potential but it is shrinking over the last 23 years: in the late 1980s, Ukraine had three times more researchers and the GERD/GDP ratio was 3%.

The country has officially 1208 research organisations and more than 68.6 thousand researchers[2] (2012). The state plays a key role in supporting the research system, while private sector has weaker contribution.

Ukraine is a unitary state and research policy is mainly directed from the central ministries, although local authorities also have some tools to exert influence, especially on local universities and research organisations.

Low private R&D expenditure is an outcome of the specific structure of the Ukrainian economy. Particularly, two thirds of BERD are concentrated in machine-building industry, while its share in the national economy contracted by 3 times during the years of independence (1991-2012). Heavy industries with low R&D intensity (ferrous metallurgy, production of basic chemicals, coal-mining) form the core of the national economy in recent years.

The Ukrainian research system is weak concerning both scientific and technological outputs as shown by international indicators relating to scientific production (publications and impact factors) and technological production (patents). Some 'tacit' knowledge is preserved in research institutes and industrial companies mainly in the fields of aviation, space and military-related sectors[3]. Production of these sectors stagnates for years, and the companies have no intention to invest in R&D.

Research policy in Ukraine is driven predominantly by the annual budget cycles, although there is the National Strategy for Social and Economic Development of Ukraine for 2004-2015 (the only such document at the national level, approved by the Parliament). Research policy focuses strongly on supporting public research sector and the training of skilled researchers but has relatively weak impact on economic development. Incentives to invest in R&D from the side of private sector are relatively weak.

Ministries and state agencies, responsible for R&D, had several re-organisations during the 1990s and 2000s. The last one was made in 2010 - 2011. However, it looks that it will not create favourable conditions for support of R&D. There are several reasons for such conclusion:

- New Tax Code (in force since 2011) does not contain substantial incentives for R&D and innovation;

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[1] http://www.worldbank.org.ua/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/UKRAINEEXTN/0,,menuPK:328539~pagePK:141159~piPK:141110~theSitePK:328533,00.html

[2] Ukrainian statistics provides data not in Full-Time Equivalent (FTE) but on those persons, who are involved in R&D in 'primary place of work'. There are also 69 thousands persons, who are working on R&D on the part-time basis. However, standard calculations of FTE are difficult to make, as the principles of time distribution between the primary and secondary working places are not identical to those, which are used in the OECD countries.

[3] Ukrainian Aeronautics Research and Technology Groups Brochure. An initiative of the FP7 Aero-Ukraine Project. – Aero-Ukraine Project Consortium, 2010 (www.aero-ukraine.eu)

- Some important legislative acts (for instance, Law on Technoparks, Law on Innovation Venture Funds) are not priority for the Parliament (some of these acts are waiting for years to be considered) ;
- Functions of the newly created State Committee of Science, Innovation and Informatisation[4] (SASII) are limited, if compare with the 'usual' ministry.

Block grants dominate the system of R&D funding, although in recent years competitive rules for fund distribution are becoming more popular.

Cooperation between public and private sector is based mainly on bilateral contacts at the level of research organisations and industrial enterprises. Universities still train large numbers of masters and PhD students in technical and natural sciences. However, the majority of them cannot be employed in the areas that they are qualified.

Knowledge Triangle

Coordination between research policy, innovation policy and education policy is not effective in Ukraine. As a result of administrative reforms of 2010-2011, functions and responsibilities between the ministries and state agencies have been changed. SASII is responsible for science and innovation policy, while the Ministry of Education and Science[5] takes care of education policy. However, the Agency has no right to control and to distribute any substantial financial resources, and it has limited capacity to influence innovation development in the country. In principle, Cabinet of Ministers of Ukraine has to coordinate all three policies but, in reality, existing procedures of such coordination and, especially, enforcement of decisions in innovation and S&T are underdeveloped and contradictory. State-owned research institutes or research organisations under indirect state control are dominant actors within R&D sector. They have relatively weak contacts with the industry and even with universities, which are predominantly involved in learning activities.

	Recent policy changes	**Assessment of strengths and weaknesses**
Research policy	'Key directions' for changes in the system of financing and control of R&D (October 2012)	These 'key directions' were prepared by the group of experts according to the decision of the Government of Ukraine, and they were approved by the Cabinet of Ministries of Ukraine in October 2012.
Innovation policy	Law On Technology Transfer (2012)	This new version of the Law describes the goals, principles and mechanisms of technology transfer (TT) in the country This law takes into account WTO norms and it is important for internationalisation of TT.
Education policy	The new version of the law on higher education was ready in mid- 2012. However, this law has not passed the Parliament till mid-2013.	The key idea of changes is to adjust it to the needs of the economy. The quality of university education in science and technology has deteriorated during the last two decades.
Other policies	No changes	

[4] State Agency of Science, Innovation and Informatisation since mid-2011

[5] The Ministry of Education and Science was created according to the Presidential Decree N240/2013 dated by April 25, 2013 as a result of division of the Ministry of Education, Science, Youth and Sport on two different ministries (the second one is the Ministry of Youth and Sports) - www.mon.gov.ua/ua//about-ministry/provisions/

There is a number of policy documents in Ukraine, including Conception of Development of National Innovation System, approved by the government in 2009, Law on Priorities in S&T Development (2010) different programmes, which contain numerous references to the role of science and innovation in their realisation (see, for instance, State Programme on Forecasting of S&T Development in Ukraine for 2008-2012). However, none of these programmes and other documents was implemented fully, according to initial plans.

It is also worth to mention, that Ukraine is a unitary state; local budgets are not important sources for financing R&D or higher education.

However, there were some changes in research policy, innovation and education policies in 2010-2011, which are described in this paper.

Changes were made in the state S&T policy in 2011-2012, which had corresponding impact on R&D but it is evident that some of them would have long-term effect, which is difficult to predict exactly (see table below).

Assessment of the national policies/measures

	Objectives	**Main national policy changes over the last year**	**Assessment of strengths and weaknesses**
1	Labour market for researchers	.The government has introduced special scheme of raising salaries in R&D sphere, as a part of compensation for the employees in the state sector. The salaries rose six times during the year. However, total increase was not significant; it could simply help to neutralize inflation processes.	These measures have not helped to stabilise the number of researchers, which continued to decline 2012.
2	Research infrastructure	No significant changes over the last year	Research infrastructure remains fragmented and outdated in many cases. However, the country still has some research facilities, which could be used jointly (polar station, observatories and so on)
3	Strengthen research institutions	The first so-called Key laboratory on biotechnology continued its activity successfully.	Key laboratory has demonstrated substantial progress and high quality results, as it was shown during annual conference of its stakeholders.
4	Knowledge transfer	• New centres for Technology transfer are going to be created in 2013-2014 • Government has extended its special programme for scientists for training and working abroad. In 2012, total amount of stipends was increased by a quarter to approximately €5.5m	• Promoting knowledge transfer using a bottom-up approach is the main focus of the government, which, however, has limited resources • This measure supports knowledge circulation. At the same time, it could stimulate outflow of researchers from the country.

	Objectives	Main national policy changes over the last year	Assessment of strengths and weaknesses
5	International cooperation with EU member states	Second stage of BILAT project on studies of co-operation between the EU and Ukraine started in September 2012.	This projects could have positive impact on processes of transformation of Ukrainian R&D and cooperation with the EU states
6	International cooperation with non-EU countries	The UNECE-supported project on improvement of innovation and R&D systems was finished at the beginning of 2013. Internet version of the project report is ready. Official publication of the final report and public discussion of its content are expected in October 2013.	Report contains recommendations, which could be useful for transformation of the national S&T policy.

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1 INTRODUCTION

The main objective of the ERAWATCH International Analytical Country Reports 2012 is to characterize and assess the evolution of the national policy mixes of the 21 countries with which the EU has a Science and Technology Agreement. The reports focus on initiatives comparable to the ERA blocks (labour market for researchers; research infrastructures; strengthening research institutions; knowledge transfer; international cooperation). They include an analysis of national R&D investment targets, the efficiency and effectiveness of national policies and investments in R&D, the articulation between research, education and innovation as well as implementation and governance issues. Particular emphasis is given to international research cooperation in each country.

2 PERFORMANCE OF THE NATIONAL RESEARCH AND INNOVATION SYSTEM AND ASSESSMENT OF RECENT POLICY CHANGES

2.1 MAIN POLICY OBJECTIVES / PRIORITIES, SOCIAL AND GLOBAL CHALLENGES

Ukraine faces a number of challenges in social and economic spheres. Some of them are related to the trends in the world economy, some are determined by the internal peculiarities of the country. Modernisation of the country and further integration into world economy is the main challenge for the country.

Traditionally, the state announces key priorities for R&D, which corresponds to the priorities of national development. Thus, six priorities were included in the new State Law of Ukraine on Priorities in Science and Technology Development N2519-VI in 2010:

- basic research of the key scientific problems in different disciplines;
- environmental studies;
- ICT;
- energy generation and energy-saving technologies;
- new materials;
- life sciences and the methods of fighting of the main deceases

All Ukrainian governments in the last decade have declared their intentions to support innovation development and to stimulate structural changes in the national economy to make it more innovative and competitive. This is a key objective, as the country has intention to be an EU member in the future, and it has to modernise its economy to improve its competitiveness and living standards of the population substantially. These national objectives are mentioned in the Presidential Programme of Economic Reforms for 2010-2014[6].

It is clear that the country's crucial problems, such as improvement of energy saving, environmental protection and modernisation of the industrial sector and infrastructure, are not going to be solved without international cooperation and acquisition of new knowledge. That is why cooperation with the EU countries is highly important for Ukraine. In general, national priorities in S&T have a lot in common with similar priorities in the EU.

2.2 STRUCTURE OF THE NATIONAL RESEARCH AND INNOVATION SYSTEM AND ITS GOVERNANCE

Ukraine is one of the largest post-Soviet countries, which was formed in 1991 after the collapse of the USSR. The population of the country is approximately 45.71m people (2011) having the tendency to decline during the last 22 years (Ukraine had more than 52m inhabitants in 1991). GDP per capita is $7.040 (PPP, 2011)[7] and the level of R&D expenditure (GERD/GDP) was 0.75% in 2012, less than 37% of EU-27 average ratio. According to the

[6] Presidential Decree N1154, dated 21.12.2010 'On measures, aimed at the provision of effective implementation of the Programme of economic reforms for 2010-2014 'Wealthy society, competitive economy, effective state'.

[7] http://www.worldbank.org.ua/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/UKRAINEEXTN/0,,menuPK:328539~pagePK:141159~piPK:141110~theSitePK:328533,00.html

official data for 2011, the share of GERD in GDP dropped to 0.73%, which is the lowest figure for all period of independence. The country still has substantial R&D potential but it is shrinking over the last 23 years: in the late 1980s, Ukraine had three times more researchers and the GERD/GDP ratio was 3%.

A special State Committee for S&T was created in 1991, later it has changed its functions and the name several times, and now the majority of its departments are included into the Ministry of Science and Education and to other ministries or state agencies (since December, 2010). This Ministry supervises the activities of the special State Committee on Science, Education and Informatisation, which has to be directly responsible for S&T policy formulation. According to the Administrative Reform of 2010, the Committee has been transformed into an 'Agency' during the first half of 2011, subordinated to the Ministry. This Ministry along with the Ministry of Economic Development and Trade (and their predecessors) plays the key role in the state science policy, although a number of other ministries and agencies distribute state funds for specific research programmes, projects and research organisations. The total number of the ministries and agencies with science budgets varied from 31 to 44 in 2000s.

Figure 1 illustrates the organisation and the main actors of the research and innovation governance system.

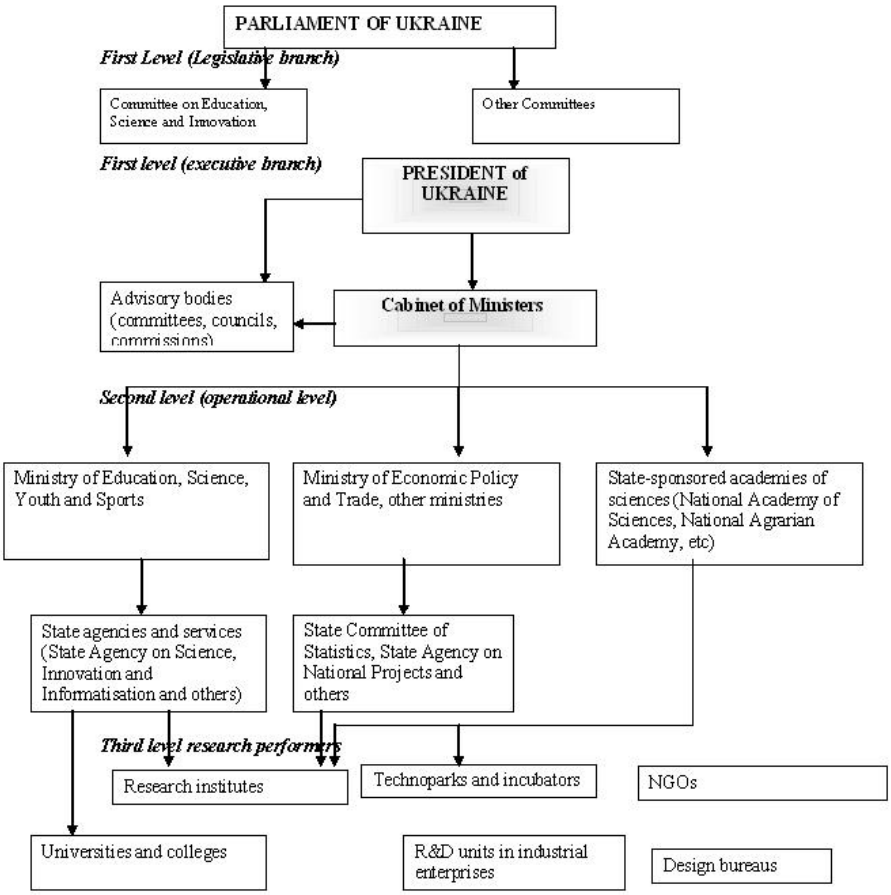
The majority of research organisations are associated with specific economic areas and focus on industrial research and development. Formally, these organisations are subordinated to the different ministries and state agencies but in recent years, ties with the ministries have weakened. The National Academy of Sciences of Ukraine and five other state-sponsored academies are traditionally very important actors in the national research system as they receive three quarters of the state budget devoted to R&D. Academies are responsible for basic research but they also have co-ordinating functions in many R&D and innovation-related programmes, the establishment of S&T priorities and the provision of scientific advice.

It is worth to mention that the boundaries between the state and private R&D organisations in Ukraine are 'blurred'. In addition to state research institutes, a number of research organisations with 'mixed ownership' exist. They owned partially by the state and, partially, by the employees. These organisations receive a fraction of their financing from the state in the form of block grants, giving the ministries the right to nominate– or, at least, take an active part in nominating– their directors. The share of direct financing from the ministries is usually not higher than 25% of an organisation's total budget. The rest of financing is contracted both from state-owned and private companies.

There is no specific R&D governance system in the regions of Ukraine. There is also no singular body at the regional level that is responsible for R&D development. Some regional administrations have created special departments, responsible for S&T and innovation policies. At the same time, according to existing legislation, regional authorities:

- are responsible for formulation of the regional R&D and innovation programmes;
- could provide financing for R&D and innovation programme within the limits of regional budgets;
- could create regional financial organisations, which could provide loans for R&D and innovation projects;
- Control and evaluate R&D and innovation activities, which are undertaken, using money from regional budgets.

Figure 1 : Overview of Ukraine's research system governance structure



Local authorities have no special funds to support R&D. The share of the regions in the total funding of R&D was about 1% in recent years. In 2011 expenditures on R&D funded by local budgets was lower than 0.26% of total expenditure on R&D in the country. The research budgets for the Kiev, Kharkiv, Poltava and Donetsk regions , spend almost 64% of the combined budget of all regions, although their amount was still less than €1.6m (approximately 16.4 million UAH), according to official exchange rate in 2011 currency. Aggregated data on R&D expenses for all regions, from all sources are not published by the State Agency of Statistics of Ukraine. As to the budget expenses, funding on R&D from both central and local budgets is distributed unevenly. Kiev receives almost 41% of all R&D expenditures, while Kharkov gets 18.2% and Dnepropetrovsk 8.5%. Other regions lag behind these three leaders.

National methodology of calculation of financing of R&D are not fully compatible with international standards but the State Agency of Statistics of Ukraine makes corresponding re-calculations and it gives such data: higher education sector 6.3%, state sector 38.0%, private sector 55.7%, including foreign sources (2011).

2.3 RESOURCE MOBILISATION

2.3.1 Financial resource provision for research activities (national and regional mechanisms)

Research policy in Ukraine is driven predominantly by the annual budget cycles, although there is the National Strategy for Social and Economic Development of Ukraine for 2004-2015 (the only such document at national level approved by the Parliament). The key goal of the Strategy is to facilitate the transition of production away from sectors relying on resource inefficient factors of development and towards knowledge intensive activities.[8] There is also a number of other documents, including the Conception of Development of National Innovation System, approved by the government in 2009, the Law on Priorities in S&T Development (2010) and different programmes that contain numerous references to the role of science in their realisation (e.g., the State Programme on Forecasting of S&T Development in Ukraine for 2008-2012)[9]. At the same time, Ukrainian statistics does not provide information on distribution of research funds according to social and economic goals. This makes it difficult to find correspondence between the national targets and expenditures on R&D.

Block grants dominate the system of R&D funds provision; however in recent years competitive rules on fund distribution have become more popular.

Crisis and depreciation of the national currency had negative impact on R&D financing. Total expenses on R&D declined from €796m (UAH8025 m) in 2007 to €680m in 2009 (according to official exchange rate) (UAH8236 m) and rose to €864.8m[10] (UAH9591 m) in 2011, while the R&D intensity (GERD as % of GDP) declined to 0.73% (2011) from more than 1% in mid 2000s. According to preliminary data, R&D intensity was 0.75% in 2012.

The state sector plays an important role in R&D financing. The bulk of state funding is used for supporting the system of the state-sponsored academies of sciences, including National Academy of Sciences of Ukraine.

The share of foreign sources in R&D funding is relatively high in Ukraine (25.8% of total expenditures on R&D in 2011). Ukrainian state statistics does not provide information about the distribution of funding according to countries of origin. However, it is known that substantial part of funding is associated with such countries, like Russia, the USA, the EU and China. In 2009-2011, the share of foreign financing increased significantly, as many Ukrainian companies have cut their expenditures on R&D.

It is evident that R&D expenditure in Ukraine (both absolute and relative) is substantially lower than in the most EU countries, especially in the case of business R&D expenditures. The main reasons for the negative trend in R&D financing are rooted in the low expenditures by the industry. The role of the business sector tends to decrease regarding both financing and implementation of R&D. In 2011, BERD was only at the level of 0.41% of GDP (including financing from foreign sources).

The most important mechanism for long-term support of science sector is the introduction of the state goal-oriented programmes. However, it is worth to stress that Ukraine has very few 'pure' research programmes. The majority of the active programmes are of a mixed nature, namely they are part of broader S&T and development programmes. In total, development

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[8] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=493%2F2004

[9] On June 22 of 2011, the Government of Ukraine issued a decision N704 on reduction of the number of existing state programmes. According to this decision, State Programme on Forecasting of S&T Development and more than 30 other programmes are terminated; other programmes will be revised or merged. It was expected that the process of revision and merger would continue till the end of 2012. However, the process has not been accomplished at the moment of writing of this report.

[10] This growth in Euro terms is associated not only with the post-crisis recovery but also with changes in exchange rate of the national currency.

programmes are thought to reach almost 150, with one-third of these containing research components[11]. However, in many cases, such research components are not financed.

The figures on the financing and implementation of the state programmes are not easily available; however, it is known that in 2009, the programmes received only 3.6% of total budget expenditures for science from the state budget. Considering the scientific components of other development programmes this level increased to 7.1% in 2008, and 9.6% in 2009.[12] No similar data for 2010 and 2011 are available.

2.3.2 Providing qualified human resources

Ukraine inherited a relatively well developed educational system from the Soviet times. It still preserves some positive features of this system. However, serious concerns regarding the quality of education in technical and natural sciences after the independence have been raised . To great extent, this is due to the economic crisis and the collapse of whole industries (e.g. electronics, precise mechanics and some others), related to military industry demands. Universities have limited interaction with the industry. As a result, education does not follow the latest advances in industry. Some hi-tech sectors do not exist anymore (for instance, electronics, and number of military-related enterprises in machine-building industry). Demand for specialists in some technical disciplines has declined, especially in industry, as they could not find the job according to their education. In mid-2000s, the share of graduates in natural sciences declined by one quarter, in technical sciences by more than one fifth, while in humanities and arts grew by 5% and in social sciences, business and law by 45% (other students were in agriculture, health care and services). No specific policy on support of education in engineering and natural sciences exists in the country. On the other hand, Ukrainian universities are trying to update their curricula in these disciplines according to the international standards. More than half of school graduates entered the universities and colleges during the period 2008-2012.

In some leading universities, students could receive special stipends for advances in sciences from the state. Similar stipends are provided by the private foundations. The level of these special stipends varies from approximately €100 (UAH1000) to several thousand € per year but the highest level it is rather exception. In general, science career is not prestigious. The level of income in science is much lower than in business sector, and, especially, in banking and insurance sectors[13].

The government has no long-term human resource policy in R&D. Existing policy could be defined as 'inertial' rather than targeted, despite recently different types of special stipends for scientists were introduced. A large number of scientists are of pension age in Ukraine. The average age of Doctors of Sciences is over 61, while the average age of Candidates of sciences is over 53[14]. The average age of researchers has being growing by one year every three years. Only in 2008-2011, the situation has changed a little and the age structure in R&D sector has

[11] It was a Decision of the Cabinet of Ministries of Ukraine (dated by June 22, 2011) to reduce the total number of programmes and to revise the content of remaining programmes. Almost 30 programmes were terminated in 2011, while the revision of the remaining programmes was in progress in 2012 - beginning of 2013.

[12] Information on the execution of the main provisions of the Law of Ukraine "On scientific and technical activity/ Letter of the MES of Ukraine to the Committee of the VRU on Science and Education on 20.05.2010, №1/10-1225-25p".

[13] Vashulenko O.S., Gryga V.Yu., Yegorov I. Yu. Scenarios of development of S&T manpower in Ukraine on the base of statistical models. – Nauka y naukoznavstvo. - №1. – 2010. – p. 28-39 (in Ukrainian).

[14] Candidate of sciences has to have a master degree, to pass 3-4 exams, defend publicly dissertation in a specialised scientific council and to have not less than 5 publications. Doctor of sciences has to be a candidate of sciences with substantial scientific experience, not less than 20 publications in leading Ukrainian journals and individual book on the topic his (her) dissertation. Public defence is also obligatory condition for obtaining a degree.

become more stable. At the same time, possibilities for career growth for young scientists are limited. The authorities have created the system, when pensioners could continue to work in the state R&D organisations and to receive their pensions and salaries simultaneously.

Ukraine has no national schemes, aiming at stimulating mobility of scientists. There are modest attempts to establish co-operation with those specialists left the country in 1990s and 2000s. However, the country could not offer to them comparable salaries and attractive working conditions.

Emigration is a more alarming issue. Existing statistics of scientific emigration in Ukraine do not reflect real size of outflow of specialists from the country. Statistics of the State Committee of Statistics of Ukraine, measure the 'pure' emigration[15] of scientists and engineers only, but not new forms of migration of scientists, such as 'shuttle migration'[16] or emigration of young specialists, including PhD students.

Formally, according to the recent data, only 41 researchers with doctorate degrees emigrated from Ukraine in 2010 and in 2011. It is in a great contrast with the early 1990s, when the number of emigrants was at the level of several hundred persons per year. In recent years, the age of emigrants decreased as more and more graduates and post- graduate students leave the country. These persons are not considered researchers, although their intellectual potential is substantial in many cases and they could constitute a potential pool of future researchers. The second problem is a 'shuttle migration', which is much more important, than the 'pure emigration' of researchers, as up to one thousands of scientists are involved in it every year. Ukrainian government has introduced recently new methods of statistical control, which reflects this type of migration more adequately.

2.3.3 Evolution towards the national R&D&I targets

In recent years the government has played a key role in Ukraine. The role of private sector has declined, especially in the period of crisis. It appears that the highest rates of input from the private business sector were recorded between 1997 and 2002; however, one should note that these figures were low from the start–in 2002 more than 80% of GERD growth was provided by business sector. After 2003, the share of BERD fell before starting to regain some strength in 2006. Manufacturing alone accounts for 86.3% of BERD, and the electric equipment sector in particular comprises approximately one quarter of BERD. Industrial research institutes along with institutes of the state academies of sciences remain the most important R&D performers, while the role of higher education in R&D performance is still insignificant.

There are four key reasons for this situation:

1. Traditional sectors (ferrous metallurgy, coal-mining, energy production, basic chemicals) dominate in the national economy. These sectors are not R&D intensive, and demand for R&D results is not high enough from their side.

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[15] Data on 'pure' emigration include only figures on emigration of scientists, who were registered in their last place of work as researchers. A number of researchers leave their institutes or universities well before they emigrated. It is also important to mention that pure emigration deals with those emigrants, who officially change their Ukrainian citizenship to the citizenship of another country.

[16] 'Shuttle migration' is a relatively new phenomenon. This type of migration is associated with the situation, when researcher spends substantial part of his (her) working time abroad in foreign research centre and another part - in Ukrainian research institute. In this case, researcher preserves his position in Ukrainian research institute or university. Usually, it is accompanied by the suspension of the salary during the period of absence. In this case, Ukrainian research institute could preserve the number of research positions and the level of financing, while researcher could receive the opportunity to work abroad for some time and guarantees of preservation of his (her) position in Ukraine.

2. Activities of the banking sector and different business organisations are aimed at providing general support to enterprises and not specifically to support R&D or innovation. Relatively high inflation and, as a result, high interest rate, do not create proper environment for investment in R&D.
3. Existing instruments of R&D support (private foundations, technoparks, business-incubators, and leasing centres) are usually poorly equipped, personnel are not trained adequately and, most importantly, financial resources are scarce.
4. Financial institutions are heavily involved in other types of entrepreneurial activities, which are more profitable in current conditions (trading operations, property development and construction). They have no incentives to support R&D.

The private non-profit sector does not play important role as funding source of R&D. The level of R&D expenditures in this sector remains less than 1% of total R&D expenses in the country. According to official statistics, its share declined to almost zero in 2010 and in 2011.

However, it is worth to mention that the data on expenditures on research and development are collected from all R&D performers, which registered their research projects in the State Committee of Statistics (SCS)[17]. This registration is obligatory for all state organizations and business enterprises (if they have such projects). However, foreign companies conducting research in Ukraine could not register their R&D. Similar situation is with NGOs. This means that the real R&D funding and expenditures in Ukraine could be higher with the share of business enterprises and the private non-profit sector could be underestimated.

The newly formed State Committee (Agency) on Science, Innovation and Informatisation has prepared a Plan in December 2010, aiming at realisation of the Programme of Economic and Social Development of the President of Ukraine "Wealthy society, competitive economy, and effective state"[18]

(*http://www.president.gov.ua/docs/Programa_reform_FINAL_1.pdf*).

This Plan includes several goals, which have to be achieved during the period 2011-2014.

According to the Plan, the purpose of economic reform is to promote innovation in the economy, and better utilisation of S&T potential for the technological modernisation of the economy. In order to achieve this goal the following objectives have been set:

- increase the competitiveness of R&D sector and foster integration of the domestic R&D into European Research Area;
- improve the efficiency of budget funding of science;
- rise the share of high technology products and services as a result of more effective implementation of R&D
- Improve the functioning of the national innovation system and infrastructure for innovation.

Proposed stages of the Plan (reforms in S&T and innovation) include:

First stage - 2010-2011:

– Determination of principles of public-private partnership in S&T and innovation spheres;

[17] The State Committee of Statistics was renamed into State Agency of Statistics in July 2011
[18] Presidential Decree N1154, dated 21.12.2010 'On measures, aimed at the provision of effective implementation of the Programme of economic reforms for 2010-2014 "Wealthy society, competitive economy, and effective state".

- Determination of principles and mechanisms of provision of the state support of investment in innovation activities;
- Negotiations with the EU on joining the ERA[19].

Second stage – till the end of 2012:

- development of infrastructure for innovation activities;
- implementation of mechanisms for the state support of innovation activities;
- increasing financial independence of research institutes and universities in utilisation of the research money, received from different customers;
- transition to international criteria of evaluation of the research results and the individual scientists, optimisation of the structure of the state research system;
- increase of the budget share of expenses on applied R&D;

Third stage – till the end of 2014:

- renovation of equipment in research institutes and the universities
- Indicators of success:
- Growth of the share of innovation enterprises from 10.7% till 25%.
- Increase of GERD from 0.95% to 1.5%.

It was assumed that the Plan would be developed and, probably, corrected during the year (2011). However, very few real actions were accomplished till end 2012.

An action plan for achieving these goals has not being presented, despite the fact that the administrative reform is under way, and functions of the state agencies were changed in 2011. At the moment, however, there are no state agencies, to which the goals and tasks of this Plan have been addressed.

At the same time, it would be challenging to achieve the abovementioned goals, given that the existing policy mix (for instance, new Tax Code, passed through Parliament at the end of 2010) contains almost no incentives for private R&D and, especially, for innovation. The government has created several expert groups at the end of 2010, which worked on different aspects of transformation of the R&D system from 2011 till the beginning of 2013. As a result, the new version of the Law on Higher Education has been prepared in 2012. However, it seems it will not pass the Parliament till autumn, 2013. The new versions of the Law on Innovation and the Law S&T Activities will have the same, if not worse destiny. Both versions were prepared in, 2012 – beginning of 2013 but the Parliament has not discussed them yet.

On September 7th, 2011, Cabinet of Ministries of Ukraine issued a resolution 'On Approval of the List of Priority Thematic Directions of R&D'. However, it contains items, which are similar to those of the Plan (2010).

In recent years, the government has focused predominantly on supporting the state sector in R&D. Research organisations of the state academies of sciences received approximately three quarters of all state funding in a form of block grants. The idea of the reform is to make R&D sector more productive and to strengthen its ties with the industry.

The state has tried to involve the private sector in research projects, but this has been met with limited success. This is largely because the state itself could not meet its obligations in financing research projects. The current share of companies taking part in state R&D and innovation programmes barely exceeded 1% of the total number of participants during the

[19] This position is included into the Plan, although Ukraine is not an EU member, and it is difficult to expect that the country could receive a membership status until the end of the Plan implementation.

period 2005-2008. Other prominent participants were universities and state research institutes[20]. No information for later period is available at the moment.

Ministries also exert influence on sectoral policies through the various branch, or sectoral, institutes under their supervision. Traditionally, branch (industrial) institutes have had strong ties with such enterprises, and conducted a great deal of research that was in the interest of the companies. However, in recent years, the importance of these institutes has declined, and the control over their activities from the side of the Ministries has weakened.

R&D institutes have to pay VAT on contracts, except contracts concluded with the state-owned organisations or ministries (for example, all contracts within state development programmes are subject of VAT exemption). Research organisations also have the right not to pay custom duties on imported scientific equipment or materials, especially if there is no possibility to produce them in Ukraine. Research and development organisations could receive some other financial incentives. These incentives depend on specific legal regulations, related to these organisations[21].

The most successful experience of undertaking and commercialisation of research projects are associated with functioning of techno parks in 1999-2005. In fact, techno parks looked more like 'clusters' of high-tech companies and groups of scientists and engineers, who could receive favourable regime for realisation of their research and innovation projects. The best techno parks were created by the institutes of the National Academy of Sciences of Ukraine with strong technological orientation (Paton Institute Electric Welding and the Institute of Mono-cristals[22]). Tax privileges could be received not by the institutes themselves but by the specific (specially registered) innovation projects.

Techno parks were successful in innovation activities in the first years of their existence (1999-2004). However, after abolishment of tax privileges in 2005, the number of innovation projects has not grown, and the importance of technopaks for the national innovation development has started to decline.

Tax incentives for R&D in business sector do not exist in Ukraine. It is only possible to detract expenses for patenting from the taxable income of individuals only, not enterprises.

Another instrument of stimulating R&D activities is the possibility to take part in different state development (or 'goal-oriented') programmes. However, the procedures of programme preparation are not completely transparent, which makes it difficult to estimate the real volume of programme funding in advance. In many programmes, research components are difficult to separate from other activities. In addition, in many cases, statistics do not provide adequate data on programmes themselves, especially for programmes that are undertaken primarily by the state-sponsored academies of sciences. In recent years, no more than 7% of all state funding was distributed through such programmes, a figure which includes data from national development programmes and the programmes of the ministries and the academies of sciences.

2.4 KNOWLEDGE DEMAND

The Ukrainian economy is a relatively a small and open economy where exports and imports account for a large share of GDP. Exports are strongly concentrated in a few economic sectors, which are not technology and research intensive. Thus, in 2010 more than two thirds

[20] On the results of audit of the effectiveness of the budget funding of state goal-oriented S&T Programmes, supervised by the Ministry of Education and Science in 2008 – Kiyv: Rakhunkova Palata, 2009 – www.ak-rada.gov.ua/contro/main/uk/publisharticle/16722660 (in Ukrainian)

[21] These incentives are regulated by special laws, such as Law on Science Parks (2009) or Law on Higher Education.

[22] This is an official title of the institute in English

of the value of Ukrainian exports was generated in three domains: ferrous metallurgy, basic chemical products and agriculture. As a result, Ukraine lags behind the EU countries regarding the share of high-tech manufacturing exports in total exports, which were fluctuating between 1% and 3% during the period 2005-2011[23]. This peculiar sectorial structure influences the demand for R&D results which remained relatively low. The Ukrainian economy is becoming increasingly oriented towards producing relatively low value added goods. Even the remaining enterprises of the machine-building sector (for example, shipbuilding), occupy the lowest segments in the world markets, not mentioning ferrous metallurgy and production of basic chemicals. Competition in such markets is particularly fierce, and Ukrainian companies are persistently jeopardised to lose their existing positions to firms from developing countries. Technologies in these sectors are relatively mature, and they do not require a lot of R&D. Sometimes, Ukrainian companies prefer to purchase technologies from abroad, as foreign partners could provide more effective solutions and better services.

Ukraine suffers from a low level of innovation activities. According to statistical surveys, the proportion of innovative enterprises in the industrial sector declined from almost 30% in 1994 to approximately 16.2% in 2011 (this is slightly higher, than in 2010, when this indicator was at the level of 13.8%).

To a large extent, it is related to the negative structural changes in the Ukrainian economy, where the share of high and medium tech sector's shrunk threefold since the beginning of 1990s, while the shares of the energy and ferrous metallurgy sectors grew substantially. These sectors have more stable technological base, and they are traditionally are less innovative than high and medium tech sectors that contributed to the overall decline of the number of innovative enterprises. Lack of direction in modernising the national economy and insufficient incentives for developing the high tech sectors are key problems for the country. The demand for R&D results and innovation from the side of national companies dropped substantially in 1990s- 2000s, and it is far from the level of late 1980s. The second group of reasons, which explain poor innovative performance, are related to the unfavourable business environment, when the indicators of the time of registration, number of permission needed and the price of the establishing new business are among the worse in the region of Central and Eastern Europe[24]. In pre-crisis years, the bulk of FDI to the Ukrainian economy were allocated in banking and trade sectors.

The state actively supports basic research by providing three quarters of its financing to the six state-sponsored academies of sciences focused on basic research. However, it is difficult to calculate the real impact of these expenditures.

National research policy is also to some extent driven by other social and political challenges which are partly similar to other European countries – like healthcare, social security, and especially - energy saving. However, as the research funding generally follows a bottom-up approach, these particular programmes only have a limited weight. Ukrainian statistics does not provide data on GBAORD allocation to socio-economic objectives.

2.5 KNOWLEDGE PRODUCTION

2.5.1 Quality and excellence of knowledge production

The performance of the public research system of Ukraine is lagging behind the world average in terms of the quantity and impact of its scientific production. According to

[23] Trend Chart data for Ukraine and the calculations on the base of data from the State Committee of Statistics website.

[24]. Zvit pro Konkurentospromozhnist Ukraini. (2011)– Fond Efektivne Upravlinnia – Kiev, - 237 p. (Report on Competitiveness of Ukraine) see also on site www.feg.org.ua (in Ukrainian)

Waingart (2009), the number of publications of Ukrainian authors varied between 4100 and 4500 during 1995-2007. This means that the share of these publications in the world publications declined from 0.52% in 1996-2000 to approximately 0.2% in 2009. Data from Scirus database are slightly better but, anyway, they also demonstrate relatively weak positions of Ukrainian science in the international arena[25]. Ukraine has especially poor record in publications in social sciences and humanities, and life sciences. However, at the same time, the shares of Ukrainian publications in some areas of technical sciences, such as welding, electric machines, and space studies are much higher. These areas remain the most advanced, if compare with other countries.

Institutes of the National Academy of Sciences are responsible for the bulk of publications in internationally refereed journals, while universities are focused more on national publications. Total number of publications in Ukraine is growing each year, and it reached 345,400 in 2010. To some extent, this is a result of specific rules, which are established in the Ukrainian research and education system, where publications in national journals are more important for obtaining scientific degrees, than publications in international journals. Only recently, some leading research organisations and universities have introduced an obligation to publish in international journals to be promoted to the next research or teaching position. However, the adjustment to international standards of R&D results evaluation is still at the very beginning.

Ukrainian universities are not included in the various world rankings among the best 500 universities of the world.

2.5.2 Policy aiming at improving the quality and excellence of knowledge production

There are a number of factors, which contribute to this relatively low position. A first factor is certainly the high degree of separation of the Ukrainian research system from the international research community. Ukrainian researchers are not very active in international co-operation and in publishing in international journals. Incentives for higher international 'visibility' are poor.

A second factor is the low level of funding, which is not enough for organising modern research. For instance, overall expenditures on new equipment in all Ukrainian research institutes and universities were lower than €14.5m (UAH161 m) in 2011. Moreover, Ukraine has only one State fund for supporting basic research, which provides grants on a competitive basis. Less than 1.5% of the state science budget is distributed through this fund. However, this fund has almost doubled its financing of research projects in the last two years (in current prices). Formally, state-sponsored academies of sciences distribute up to 15% of their funds on so-called perspective research on a semi-competitive basis. However, only institutes from the particular academy could participate in these specific competitions.

In 2011, the State Agency for Science, Innovation and Informatisation has created the first so-called State Key Laboratory for Molecular and Cell Biology. This is an important event in the Ukrainian science, as the projects for the Laboratory were selected on a competitive basis by the panel of fifteen foreign experts[26].

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[25] White Paper on Opportunities and Challenges in View of Enhancing the EU Cooperation with Eastern Europe, Central Asia and South Caucasus in Science, Research, and Innovation (2011). - http://www.internationales-buero.de/de/45.php - p. 164

[26] Resolution N6, dated on April 6, 2011 of the State Agency for Science, Informatisation and Innovation on Creation of the State Key Laboratory for Molecular and Cell Biology – Svit, April, 29, 2011

A third factor is a weak demand for R&D results from the side of industry. In contrast with the leading EU countries, business sector does not play a leading role in funding or executing R&D.

Two types of evaluations are used in the public research sector. The first one is based on the evaluation of activities of the state research organisations. This evaluation is usually based on qualitative assessment and some selected indicators (number of research papers, patents, participation in international conferences and so on) of the research activities of the institute. However, qualitative assessment from the side of the Presidium of the Academy or the Ministry is more important than formal indicators.

The second type of evaluation is associated with the assessment of research projects and programmes implemented by research institutes. According to the Law, the following types of projects and programmes are subject to obligatory external evaluation:

- State S&T programmes;
- International S&T projects, which are undertaken in the Ukrainian territory and according to the international agreements between Ukraine and other countries;
- Branch and inter-branch S&T and innovation programmes;
- Innovation programmes and projects of the state –level importance[27].

The evaluation of project implementation is usually made by a commission formed by the corresponding Ministry at least once per year, and at the end of the project. If the project has identified 'key performance indicators', then the project results are compared to these indicators. However, very often the objectives of innovation projects are not defined in sufficient detail. In addition, very few projects have sufficient budget to reach their proclaimed objectives. This is frequently cited as the reason why project results are inadequate.

The State Auditing Chamber, a division subordinate to Parliament, examines the activities of different ministries and state-sponsored academies of sciences approximately once every two years. Auditors typically focus on the relevance of R&D expenditures compared with the announced goals, and also fix violations of existing legislative acts. Benchmarking exercises have not been made in Ukraine, except once during the EU-sponsored BRUIT project on Trend Chart for Russia and Ukraine in 2007-2008[28]. Another attempt to compare performance of Ukraine with the EU countries in innovation and R&D spheres was made in 2011 within a Europe Aid Project 127694/C/SER/UA but with limited number of indicators[29].

However, comparisons with the best examples are often used implicitly in evaluation procedures. The good record of participation in research projects is a precondition for success in the future. No special incentives are used, except special state awards for advances in sciences to honour the best researchers.

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[27] Shkvorets Yu.F. Zakonodavcha y normativno- pravova basa tsilyovyh program v krainah SND: Porivnyalnyi analis – Problemy i Perspsktivy Innovatsionnogo Razvitia Ekonomiki. Materialy XIII mezhdunarodnoi nauchno-prakticheskoi konferentsii po innovatsionnoi deyatelnosti. – Kiev-Simferopol-Sevastopol, 2008. – P. 97-101 (Legal base of the goal-oriented programs in CIS countries; Comparative analysis. – in Ukrainian)

[28] http://www.proinno-europe.eu/index.cfm?fuseaction=page.display&topicID=52&parentID=52

[29] Enhance Innovation Policies, Strategies and Regulation in Ukraine. - EuropeAid Project 127694/C/SER/UA (2011). – Kiev. Fenix, vol.3, - 74 pages

2.6 KNOWLEDGE CIRCULATION

2.6.1 Knowledge circulation between the universities, PROs and business sectors

The state policy, aimed on strengthening interaction between the industry, research sector (it is predominantly under the control of the state in Ukraine) and the higher education sector, includes several positions:

- development of research infrastructure, including the centres of common utilisation of research equipment by different research organisations;
- creation of special organisations for exploitation of research results and technology transfer;
- introduction of special (small) grants, which promote co-operation in R&D between research institutes and the Universities;

The most successful example of cooperation within the knowledge triangle is the development of techno parks.

Among the techno parks two of them could be considered as very successful, namely the Paton Institute of Electric Welding and the Institute of Mono-cristals. They comprise more than 95% of all innovation production of techno parks in 2000-2011. Total volume of innovation production in techno park's projects reached almost €400m (UAH2330m) in 2005. It is evident that Ukrainian techno parks were the most successful initiative in the S&T and innovation domain within the independent Ukraine. Political instability of 2004-2010 has led to postponing the adoption of a new law on techno parks for several times.

Ukrainian government encourages knowledge circulation by the means of various instruments. Most importantly, it tries to conclude long-term agreements on co-operation in S&T. The Ministry of Education and Science also provides modest funding for the joint projects (only Ukrainian partner could be funded) organisation of international workshops and conferences. Foreign companies, which are operating in Ukraine, are important sources of knowledge and new technologies too; despite exact figures on technology transfer trough these companies are not known.

Ukraine is trying to participate in different international programmes and projects but its financial resources are very limited to take an active part in all of them.

2.7 OVERALL ASSESSMENT

Ukrainian research policy is rather volatile in terms of orientation and budgetary planning. Plans, drown in 1990s and 2000s, were not fulfilled, and the system had tendency to decline in the last two decades.

The government has developed some measures addressing the following main issues in Ukrainian research policy:

- Establishment of research priorities, which correspond to the goals of national development.
- Clear declaration of the orientation of the R&D on the best EU standards and intention to join ERA in the future.
- Changes in administrative system, which would have positive impact on R&D governance.

However, policy measures in different strategic documents are much less concerned with the identification of knowledge demands and especially of providing strategic intelligence on structural changes in the economy Also, rather limited measures have been envisaged to

improve knowledge circulation, to meet business knowledge demands and to increase resources mobilisation in the private sector.

Ukrainian research and innovation policy in respect to industry is almost exclusively focused on direct state support of the six national academies of sciences, state-owned companies and state universities. While this policy has not been highly successful, it has minimal impact on the bulk of Ukrainian private companies and on research and innovation activities, which are performed by multinational companies. In this area there is a noteworthy lack of coordination between research policy (focusing on the quality of academic research and provision of skilled researchers) and economic promotion policy (focusing on market and localisation conditions), because of fragmentation of responsibilities of the state ministries and agencies, as well as central and regional authorities.

3 NATIONAL POLICIES FOR R&D&I

3.1 LABOUR MARKET FOR RESEARCHERS

3.1.1 Stocks of researchers

There were 70.4 thousand researchers in Ukraine in 2011[30]. The number of researchers is declining since 1990s. In 1995[31]-2010, total number of researchers dropped by 2.23 times, although in 2000-2011 the process of shrinking of the research community was substantially slower: total number of researchers declined by 21..1% only[32]. The general level of R&D financing was stagnant in Euro terms in 2000s due to permanently high inflation and depreciation of the national currency,[33] thus increasing the available overall investment per researcher.

Ukraine has no special policy for enhancing mobility of researchers. In recent years, the state is trying to keep young researchers by establishing different stipends and awards but these measures are not very effective.

In fact, national statistics do not provide data on immigration of researchers while the majority of experts assume the number of such immigrants is insignificant. Several dozens of foreign researchers are staying in leading Ukrainian universities (but they are involved mostly in teaching), while some researchers are involved in think-tank activities in sociology and economics. No exact data on the number of such researchers are published.

In 2005-2011, less than 50 researchers with scientific degrees emigrated from the country annually. At the same time, approximately one thousand researchers had long-term visits abroad every year and more than one quarter of them have stayed in foreign countries for more than one year. This means that the mode of emigration has changed from permanent migration to a 'shuttle' one.

Official data are published only for graduates, not for doctorate students. The number of tertiary graduates in science and technology per 1,000 persons aged 20-29 years had strong tendency to grow in the recent years (from 41.2 in 2004 to 47.3 in 2011). However, as it was mentioned above, the number of graduates in natural sciences and engineering out of the total number of graduates is declining, while at the same time the total number of PhD holders and the candidates of sciences is growing. The number of candidates of sciences grew from 59 thousands in 2000 to 85 thousands in 2011, and the number of doctors of sciences from 10.3 thousands to 14.9 thousands during the same period. However, only 20.6% of them were involved in R&D as their primary job task (2011). Most of specialists with scientific degrees are working as lecturers in non-research institutes and universities.

[30] It is important to stress that Ukrainian statistics of research personnel in full-time equivalent (FTE) does not correspond to Frascati Manual standards. Here, data on those researchers, who are involved in R&D as their 'primary activities' are used. According to our unofficial estimates, real number of researchers in FTE is 20-30% higher, than the figure, mentioned in this report.

[31] The first year, when new standards of R&D statistics were introduced in Ukraine

[32] S&T and Innovation Activities in Ukraine. Statistical Yearbook.- State Committee of Statistics of Ukraine. Kyiv – 2006, p. 58 and S&T and Innovation Activities in Ukraine. Statistical Yearbook.- State Committee of Statistics of Ukraine. Kyiv – 2012, p. 32 (in Ukrainian)

[33] Inflation was higher than 10% per year during 2000-2010. The highest level of 24% was observed in 2008. At the same time, nominal overall expenses on R&D grew by more than 4 times during this period.

3.1.2 Providing attractive employment and working conditions

Researchers usually have permanent contracts. However, they could receive temporary contracts if they are on pension or if they are working in several places (usually part-time) simultaneously. Temporary contracts are subject of all general taxes.

R&D is not the most attractive field of work for the young generation of Ukraine, as well as for foreigners. Foreigners could work in Ukrainian research institutes but in this case, the institute has to pay higher contribution for social security, and the person has to pay higher taxes (for instance, 30% of income tax against 15% for Ukrainian citizens). In addition, the level of salaries in Ukrainian research institutes and universities is so low (average salary is up to €500-600 per month according to official exchange rate), if compare with salaries in the EU countries. It is also important for foreigners to have a permanent registration in the country and permission for work. In principle, anyone could apply for work but conditions of work and the level of salaries are not competitive comparing with the EU countries.

If compare R&D with other sectors of the national economy by the level of salaries, it is lagging behind of the sector of the banking and financial services and the sector of state governance. These two sectors attract more talented young persons, than R&D in two recent decades. Women are widely represented in R&D, they constitute 45.5% of the total number of researchers in Ukraine (2011). In some disciplines, such as arts, history, philological, pedagogical and medical sciences they have overall majority. On the other hand, only 32.1% of researchers in physics and mathematics are women[34]. There are no acts or regulations in Ukraine, which promote higher representation of women in R&D. Gender equality is a basic principle of Ukrainian constitution. However, in reality, women have more problems in building their research careers, than men. This could be explained by traditional values of the society and by the fact, that updating of knowledge is going quickly and it requires permanent efforts from the side of scholars to react adequately on changes. In many cases, it is difficult for women to combine child care and related career leaves with uninterrupted professional activities. As a result, very few women have reached highest positions in the Ukrainian scientific hierarchy.

It is also worth to mention that the results of the policy, aiming at attracting talented youth to R&D sector remain modest, despite the state efforts to stimulate interaction between research and education.

Special state stipends for young scientists were increased two to four fold in 2008-2011, depending on the type of the stipend. The same situation exists for the state awards for advancement in science. This means that the government is trying to support the most talented specialists and to stimulate their work within the country.

Young scientists (up to 35 years old) have four main types of special stipends:

1. Special stipends for young doctors of sciences. The stipend was introduced in the beginning of 2009. There are less than 50 such persons in Ukraine, and they have to compete for 20 stipends of €200 (UAH2100) per month.
2. Stipends of the President of Ukraine (for candidates of sciences, €90 (UAH1000) per month each) 300-400 stipends per year.
3. Stipends for young scientists from the Presidium of the National Academy of Sciences (€70 (UAH800) per month each), 400 - 500 stipends.
4. Regional stipends for young scientists (vary from €30 to 120 (UAH350-1350) per month) – not more than 300-400 for the whole country.

The Government has also special stipends for experienced scientists. Their number and the size vary but not more than 150 such stipends were provided in recent years. At the same

[34] S&T and Innovation Activities in Ukraine. Statistical Yearbook.- State Committee of Statistics of Ukraine. Kyiv – 2012, p. 48 (in Ukrainian)

time, there are approximately 1000 persons in Ukraine, who have the titles of academicians or corresponding members of the state academies of sciences. This provides them with monthly 'stipend' of €250-450 (UAH2800-5000) till the end of their life. These stipends are higher than the level of average monthly wages in the country. All stipends are added to the salaries or pensions.

There are also several different competitions for the state awards in almost all scientific disciplines, which stimulate researchers to work better. Winners are selected on the competitive basis.

3.1.3 Open recruitment and portability of grants

Formally, recruitment of scientists is a competitive process. Researcher has to meet specific professional requirements to obtain position in scientific organisation. However, in conditions of reduction of research staff and the number of institutes, new positions are few. On the other hand, it is difficult to interrupt existing contract with individual researcher without serious reasons.

As we mentioned above, Ukraine has a two-level system of scientific degrees, inherited from the Soviet Union[35]. It is not possible to obtain position of professor or associate professor without one of these degrees, and it is almost impossible to be a chair without doctor's degree. Foreign degrees are not recognised automatically in Ukraine. The procedure of recognition is rather complicated and it could take a number of months.

In principle, non-nationals could compete for positions in Ukrainian universities and research institutes. However, it is difficult to do in practice. There are few reasons for this. First of all, there is language barrier, as all higher education, as a rule, has to be in official state language (Ukrainian). The second reason is related to the general regulations for employment of foreigners, which give clear advantage for the citizens of Ukraine. The third reason is relatively low salaries in research sector, as it was mentioned above.

Government provides special individual stipends to the different categories of scientists to keep them in research institutes. This type of financing is different from competitive financing of research projects, as it is distributed usually not for specific projects but for individuals. The procedure is based on the assessment of results, obtained in the past. In principle, such stipends could be received by foreigners too. However, the proposed measures are not adequate to stimulate foreign scientists to work in Ukraine, as the level of salaries in foreign laboratories remains much higher than for the Ukrainian ones.

Individual research grants from public funds are available for Ukrainian citizens, not for foreigners.

It is also very difficult to transfer any project from one research establishment to another. There were no cases in Ukrainian history, when publicly financed projects (or grants) were transferred to foreign institutes.

3.1.4 Enhancing the training, skills and experience of researchers

In principle, everyone could receive post-graduate education or training in Ukraine. However, for most fields, the standard language of education on this level is Ukrainian. This creates serious barriers for potential foreign post-graduate students from foreign countries.

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[35] Candidate of sciences has to have a master degree, to pass 3-4 exams, defend publicly dissertation in a scientific council of the research institute or university and to have not less than 5 publications. Doctor of sciences has to be a candidate of sciences with substantial scientific experience, not less than 20 publications in leading Ukrainian journals and individual book on the topic his (her) dissertation. Public defense is also obligatory.

It is possible to obtain PhD in Ukraine 'on commercial bases by paying fees to the University or an institute of the state-sponsored academy of sciences[36]. Some Ukrainian Universities, e.g. the National Technical University KPI, the National Academy of Management have established master programmes in collaboration with foreign universities. International organisations financed by foreign governments (USA, EU countries, Russia) are also offering such programmes.

A number of business schools have established in the country. As a rule these schools have strong contacts with corresponding business schools abroad. Examples of instructions in English language for PhD courses are relatively rare.

International mobility is not considered as an asset by the administration of many Ukrainian universities or even by some research institutes.

In 2011-2012, the Ministry of Education, Science, Youth and Sports[37] started a new initiative, aimed at intensifying knowledge circulation. It disbursed more than €11m (UAH 44m) from the state budget for training and research of Ukrainian postgraduate students and scholars abroad. The funds are distributed on the competitive basis. The only problem is that only graduates and academics from the higher education sector, not scholars from the state-sponsored academies of sciences or state-controlled industrial institutes are eligible[38].

3.2 RESEARCH INFRASTRUCTURES

During the Soviet era, Ukrainian scientific and development organisations played an important role in the division of labour throughout the Soviet Union. Key macroeconomic indicators concerning industrial capacity for Ukraine used to match those for the Soviet Union as a whole. Ukraine accommodated nearly 20% of the experimental facilities of the USSR including nuclear reactors, astronomic observatories, and ships for marine research and so on. Substantial part of this infrastructure has been lost in the period of independence. Many institutes have no financial resources to renew research equipment, thus the rate of its renewal was not higher than 2-3% per year in 1990s -2000s. The situation started changing slightly in the second half of 2000s, but it is still difficult to find modern research devices and instruments in the Ukrainian research institutes. This fact is usually mentioned as the second most important factor of emigration of qualified scientists, after the low salaries. The obsolescence of research infrastructure is particularly evident in natural and life sciences and in some engineering areas. The problem developed over many years and has now reached such proportions that neither quick nor inexpensive solutions are feasible. Because equipment is expensive to replace, institutions seek ways to extend the life of their equipment. Much of the older equipment is frequently in need of repair. Most of the research tools cannot compete with modern Western equipment undermining the quality of research and the position of Ukrainian scientists compared to their colleagues aboard. The outlook on research instrumentation in Ukraine is not promising in the near term. It is clear that government action is required to reverse the deterioration trend of the in the research system, but it seems that resources are so limited that further decline is inevitable.

[36] PhD diplomas are issued now along with traditional diploma by the special department of the Ministry of Education and Science. Such diplomas are popular among foreigners and those Ukrainians, who are interested in working abroad

[37] The Ministry of Education and Science since April, 2013

[38] http://mon.gov.ua/index.php/ua/8830-dmitro-tabachnik-uryad-pridilyae-znachnu-uvagu-pitannyu-zabezpechennya-akademichnoji-mobilnosti-studentiv-vikladachiv-i-naukovtsiv

3.3 STRENGTHENING RESEARCH INSTITUTIONS

3.3.1 Quality of National Higher Education System

The total number of Universities exceeds 350 but only 173 of them perform R&D (2011). Approximately 25% of them are private universities. The number of students grew from 1.5m in 2001 to 2.5m in 2009-2011. At the same time, forecasts of further growth are not so bright. Demographic situation in the country is such that, the number of students will decline in the coming years. The number of foreign students is not high and they do not play significant role in educational system. Several foreign universities have established their campuses in Ukraine, including Moscow Lomonosov University and International Solomon University.

Traditionally, university sector plays a subordinate role in the national research system in Ukraine, as it focuses mainly on teaching. The total expenditure on R&D in higher education sector was less than €54.8m (UAH608m) in 2011 representing 5% to 7% of GERD during the second half of the last decade. 70% of this funding comes from the state and local budgets.

On the other hand, more than two thirds of persons with degrees of candidates of sciences and doctors of sciences are working in the higher education sector. According to the national statistics, they produce almost 78% of research papers. However, the National Academy of Sciences has more publications in internationally recognised journals.

Universities have a status of non-profit organisations, and they could lose this status if they will start some types of commercial activities (for instance, if they would start to create joint ventures with commercial companies with the aim to obtain profit). The current status of the universities gives them a number of privileges in taxation. Therefore, losing this status could lead to serious disadvantages immediately, while possible benefits from commercialising of R&D results are not evident.

Ukraine has its own system of rating universities, being responsibility of the Ministry of Education, Science, Youth and Sports[39]. The Ministry slightly diversified the assessment indicators depending on universities specialisation (for instance, economic and technical universities are subject to different ranking). Number of publications, participation in international conferences, and level of financing of R&D are among the key assessment indicators. However, it is important to stress that some indicators, such as number of citations in internationally recognised journals or number of foreign students, which are common for ranking universities in other countries, are not used in Ukraine. The system remains internally oriented. Participation in prestigious international programmes, such as EU-sponsored Marie Curie or American Fulbright Programme has no formal impact on Academic career. The situation has started to change only recently, when leading universities require publications in foreign journals from their employees to obtain higher positions.

3.3.2 Academic autonomy

Traditionally, the Ukrainian university system has been led by government with respect to general strategy and administration and by strong authority of rectors. Departments have a lot of autonomy in choosing research programmes in contrast to their economic autonomy that is very limited.

According to the laws on higher education and science, state-owned Ukrainian research institutes and universities are not fully independent organisations. They receive the bulk of their funding from the state, and the government has the right to approve the appointment of the elected rectors and directors. The state used this right quite frequently in the 2000s.

[39] The Ministry of Education and Science since April, 2013

Universities are usually subordinated to the Ministry of Education, Science, Youth and Sports[40] but if they have evident industry affiliation, they are supervised by the corresponding ministry. Thus, the University of Civil Aviation and the Academy of Railway Transport are working under the control of the Ministry of Transport[41].

There are six academies of sciences, which form the core of the Ukrainian research system. The National Academy of Sciences of Ukraine with its 206 research establishments and 37.4 thousand employees plays the key role among them.

It is worth to mention that the state-sponsored academies of sciences, especially the largest one – the National Academy of Sciences of Ukraine, are not subsumed to the Ministry of Education and Science but to the Cabinet of Ministries of Ukraine. They have a relative autonomy and need to coordinate their activities with the Ministry. As well, the Ministry attracts representatives of the Academy as key experts, if it launches any research programme, especially - for basic research. As a rule, such programmes have to be approved by the Cabinet of Ministries or by the Parliament, and it is almost impossible to do without official support from the side of the Academy of Sciences. Academy has also a strong voice in the State Fund for Fundamental Research, which formally subordinate to the Ministry.

Ukrainian universities are increasingly under pressure to define a more focused profile of their activities, as a consequence of the shrinking research funding, especially in the crisis years.

The new draft Law on higher education was prepared in June, 2012, and it is not going to be discussed in the Parliament before summer 2013. Preliminary hearings showed that key positions of the draft would be preserved, as all political forces agreed with proposed changes. This new version of the Law contains a common regulatory framework for the whole system of higher education, and it establishes clear rules for governing universities. It also determines the role of the state in this process more clearly. The new law gives more rights to the university administrations for distribution of financial resources. Now, this sphere is strictly regulated, especially in the case of state universities.

3.3.3 Academic funding

The bulk of money on R&D is distributed to the universities through the state budget as block grants. In recent years, Universities spent less that 7% of total expenditures on R&D. Their share in the state R&D budget was much smaller than the share of the state-sponsored academies. At the same time, the government is trying to use different state programmes to support R&D. However, no more than 15% of all state funding was distributed through this route. This figure includes data on the research parts of the national programmes of development and data on different programmes of the ministries and the academies of sciences.

There are no 'pure' research programmes at the state level. Research components are included into different development programmes or so-called goal-oriented programmes in sectors and industries. Probably, the only exclusion is the state goal-oriented programme "Research at the Universities for 2008-2012". The programme was approved by a decision of the Cabinet of Ministries of Ukraine N1155 on September 19th, 2007. Key idea of the programme to support best research projects at the universities. However, the financing of this programme started in 2009 only, and the total level of financing was about €1.2m (UAH11 m) only[42].

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[40] The Ministry of Education and Science since April, 2013

[41] The Ministry of Infrastructure since 2011

[42] Ilchenko M.Yu., ed. Nauka v Universitetah (Sceince in Universities) . – Kyiv.- TOV 'VD EKMO'. - 2010. – 356 pages. (in Ukrainian)

The procedure of programme preparation was not completely transparent, and it is difficult to estimate the real volume of programme funding due to two reasons. First, in many programmes 'research components' are difficult to separate from other activities. The second is that state statistics in many cases do not provide data on programmes, especially, if the programme is undertaken primarily by the institutes of the state-sponsored academies of sciences.

Substantial part of funding of Ukrainian research centres is coming from abroad, first of all from Russia, EU, China and the USA. The level of foreign sources in financing of R&D reached 25.5% of total financing in 2011[43].

3.4 KNOWLEDGE TRANSFER

3.4.1 Intellectual Property (IP) Policies

Ukraine has joined all key international agreements on IPR, and the situation is improving in this field every year.

General approach in the IP sphere is that all results, especially patents, obtained during the work in a research organisation, belong to the organisation. As to publications, rules are not so strict. If it is not specially mentioned in the contract, results could be published in learning journals by the author. There is a number of annual awards for distinguished academic results in the country. The administration of a university or research institute can establish an award for an invention but this is not a rule. Conflict of interest between inventor and administration could be solved through the court.

Data on number of patents are collected by the State Agency on IP. Some universities and state-sponsored academies of sciences have their own offices for commercialisation of knowledge but, bearing in mind the achieved number of licenses and the volume of royalties, they are not very successful.

Ukraine has very few American or EU patents, in comparison with other countries of the region, even with countries of a smaller size. Partially, it could be explained by the relatively high costs of patenting in these countries but the state has no special programme of support patenting abroad, despite discussion about such programme is still continuing in Ukraine.

In principle, universities could create their own techno parks and semi-dependent firms but the distribution of property rights on R&D results is not clear. Rectors of Ukrainian universities have a lot of rights, and in many cases, university professors could not undertake any activities without their permissions. University administration has almost total control over extra activities of its employees. It provides office space and equipment, which is not available from other sources. In reality, in exchange, authorities ask to provide a great share of the income from R&D to the universities or even transfer of all property rights to the administration of the university. Uncertainty with the property rights contributes to the unwillingness of the university personnel to work actively within the existing system of relations between them and the universities. The most popular way of doing research is to work on contracts with foreign or domestic customers. In many cases, these contracts are not registered officially through universities or research institutes.

[43] S&T and Innovation Activities in Ukraine. Statistical Yearbook. - State Committee of Statistics of Ukraine. Kyiv – 2012, p. 81 (in Ukrainian)

3.4.2 Other policy measures aiming to promote public-private knowledge transfer

Spinoffs

There is no special state policy to promote start-ups. In general, Ukrainian laws do not set any special provisions for the creation and development of spin-offs. New companies have to pay relatively high taxes from the very beginning. That is why the State Law on Science Park KPI was introduced at the beginning of 2007. The Law has opened more opportunities for creation of spin-offs by the universities. In 2009, this Law has been extended for other universities. Unfortunately, the introduction of the Law coincided with the beginning of the economic crisis, and the first results were very modest. According to data for 2010, the 'turnover' of techno park was less than €1.5m (UAH16 m)[44].

Inter-sectoral mobility

No specific information for inter-sectoral mobility within the R&D sphere in Ukraine exists. Qualification requirements to different research positions are relatively well-defined in Ukrainian research institutes, and, in principle, they could be obtained on competitive basis.

However, as it was mentioned above, an outflow of researchers from R&D sector was significant in 1990s and 2000s. The bulk of those, who left research sector, moved to other sectors of the national economy. Most of them found themselves in the government, banking and financial spheres and trade. At the same time, it is worth to mention that research institutes in the industrial sector were affected more seriously by the negative changes in research system than the institutes within the state academies of sciences during these years. In contrast, the university personnel has grown up. A number of persons with highest scientific degrees[45] left research sector for educational careers. It was not difficult to make, as highest scientific degree opens the way for obtaining good position at the university. However, there are extra education-related criteria, which are important for professorship. On the other hand, it is not so easy to move from business or government or educational sector to the research sector mainly due to the substantial decline in the number of positions, which are available in research institutes.

Promoting research institutions - SME interactions

There are no special programmes on support of co-operation between research institutions and SMEs in Ukraine.

Involvement of private sector in the governance bodies of HEIs and PROs

The involvement of private sector in the governing bodies of HEIs and PROs is not common, though the choice remains at the universities.

Regional Development policy

There is no specific R&D governance system in the regions of Ukraine. There is also no singular body at the regional level that is responsible for R&D development. Some regional administrations have created special departments, responsible for S&T and innovation policies. Most of regions have special offices for distribution of S&T information. Some regions are trying to use them for technology transfer. However, they are not very successful in this sphere, according to data about the number of licenses and level of financing of R&D from local and regional budgets[46].

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[44] No new data for 2011 have been published till May 2013

[45] In Ukraine, candidates of sciences and doctors of sciences belong to this category

[46] Krasovska O., Yevtukhova T., Legenko Yu., eds. Regional Innovation Systems: Experience of Developed Countries and Perspectives of its Utilization in Ukraine – TSNTEI: Kyiv, 2012, 253 p. (in Ukrainian)

3.5 ASSESSMENT

The government plays a leading role in financing and governing of R&D. This role has strengthened in the period of crisis. Business enterprises receive relatively weak support from the side of the state. They predominantly rely on their own financial resources and orders from abroad. Ukrainian statistics does not provide data on the sources of financing of R&D projects from specific countries (only general data on financing of R&D from foreign sources are available) but information from some sectors show, that Russian companies are the most important funders (and key customers of R&D results) of the Ukrainian business sector. University sector does not play a significant role in funding R&D, as well as the private non-profit sector.

Public research organisations form the core of the Ukrainian research system[47]. The majority of these organisations are research institutes and design bureau, which are operating within the framework of the state funded academies of sciences or under the formal supervision of different ministries.

The Ukrainian research system is relatively weak both concerning scientific and technological outputs, as shown by international indicators concerning scientific production (publications and impact factors) and technological production (patents). The country needs to develop measures, aimed at supporting patenting abroad.

The cooperation between the research sector and industry is not strong, and it is based on bilateral formal and informal contacts at the level of research units. Ukrainian universities train large numbers of students in technical and natural sciences, but the demand by industry, which is dominated by traditional sectors, is not high.

R&D and innovation-related programmes are numerous, and in the past it was difficult to find money for their realisation. It is much better to have fewer programmes that will receive better financing.

Ministries and state agencies that are responsible for supporting R&D, have overlapping functions, which are not clearly defined. The procedures of evaluation and selection of R&D projects are not transparent and fair for potential participants; some of them could have substantial privileges thanks to their direct influence over the results of the competition.

Support of elements of R&D and innovation infrastructure are not very effective, as the rules of their functioning, including regulation of activities of the technoparks and science parks are revised substantially (and mostly negatively) within relatively short period of time.

[47] The word ‘public’ is not used in official Ukrainian statistics

4 INTERNATIONAL R&D&I COOPERATION

4.1 MAIN FEATURES OF INTERNATIONAL COOPERATION POLICY

Traditionally, Ukraine has attempted to co-operate in R&D with different countries. Formally, R&D and the need for international cooperation to solve urgent national problems are mentioned in almost all strategic documents issued by executive power; as well as corresponding legislative acts of the Ukrainian Parliament. Bilateral and multilateral agreements form the basis for such cooperation.

Some Ukrainian research organisations have preserved contacts with partners both from the Russian Federation and other post-Soviet states. This is due to the existing distribution of functions between research centres in the Soviet Union. For instance, Ukrainian astronomers took an active part in the creation of observatories in the Caucasus, and used them for their long-term research programmes. On the other hand, Ukraine had a special research base and even small research fleet for marine research in the 'southern seas'[48], which has been used by scientists from other post-Soviet republics.

The country is a party to all Commonwealth of Independent States (CIS) agreements, which are related to innovation and S&T. However, these agreements fail to function effectively, for two main reasons:

- demand for R&D results in these states is relatively low
- CIS countries have not developed procedures for transfer of research grant money from one country to another. This means that in almost all cases these countries are only able to finance their own parts of the projects

In the years of independence, Ukraine has substantially diversified its international contacts in S&T. This can be explained, firstly, by the desire to receive access to world- class expertise in different scientific disciplines, which cannot be provided within the framework of post-Soviet science. Another important reason for development of international cooperation with new partners is the search for new fields and countries – both for the application of research results and as sources for financing research projects. However, the possibilities of such cooperation have been limited by financial constraints, as the country had severe economic problems in the1990s and late 2000s[49]. The state simply had no resources for adequate support of international research projects.

In any case, the main feature of scientific cooperation of Ukraine in recent years is the shift from predominant cooperation with Russia to a more diversified model with growing roles played by the EU, USA, China and other leading scientific centres of the modern world.

4.2 NATIONAL PARTICIPATION IN INTERGOVERNMENTAL ORGANISATIONS AND SCHEMES

Ukraine usually uses three main schemes for participation in multi-lateral and bi-lateral international agreements.

Firstly, it only pays Ukraine's own contributions, to finance national parts of projects. In many cases, research costs are lower in Ukraine than in developed countries, and, despite total financing being quite modest, such an approach allows participation in projects without the need for substantial investment.

[48] The National Academy of Sciences of Ukraine even has a special research Institute for Studies of the Southern Seas

[49] In the 1990s, Ukraine was the only country among post-Soviet and Eastern European states which failed to register a single year of economic growth; while in 2009 the decline in GDP was more than 15%.

Secondly, Ukraine makes in-kind contributions to international projects. The country has important elements of research infrastructure -such as astronomic observatories, research vessels, national parks with unique plants and animals, the Chernobyl zone and so on.

Third, Ukraine takes part in special calls of international projects, which are financed from the common budget but do not require separate contributions from the country.

Ukrainian scientists use elements of the inter-governmental research infrastructure by working in international research centres, such as the Dubna Nuclear Centre and CERN; on the basis of bilateral agreements with these organisations.

4.3 COOPERATION WITH THE EU

4.3.1 Participation in EU Framework Programmes

In 2002, Ukraine signed an agreement with the EU on S&T co-operation, including basic and applied research and technology development. Key thematic areas of co-operation were also determined. They comprise environmental and climate research, including observation of the Earth's surface; biomedical research and health protection; agriculture, forestry and fishery; industrial technologies; material science and metrology; non-nuclear power engineering; transport; information society technologies; social research; S&T policy studies; training and the exchange of specialists. This agreement supplemented earlier documents that were signed in the 1990s (The Agreement on Partnership and Collaboration between Ukraine and the EU and some others), opening the way for co-operation between Ukraine and the EU in different areas of science and education (programmes such as Tacis-Ace, Tacis-Tempus and INTAS).

In 2005, Ukraine and the EU signed an Action Plan, containing important references to the need to develop co-operation in R&D. The Action Plan was an important component of the European Neighbourhood Policy. Recently the Ukrainian Parliament has approved an official Ukrainian application to Eureka. Ukraine has a number of bilateral agreements on S&T co-operation with individual EU countries, which complement the main agreement with the EU. In recent years, all Ukrainian governments have announced their intention to develop closer relations with the EU, and European Union policy has a strong influence on formulation of science policy in Ukraine.

Ukraine concluded a new agreement with the EU on S&T co-operation in 2010, which was implemented in 2011. It could open new opportunities for co-operation and it creates framework conditions for a number of joint initiatives.

Bearing in mind the intention of the country to join the EU in the future, the Ukrainian authorities are interested in harmonisation of national research policy with EU policy.

As part of the Eastern Partnership initiative, four important policy projects - related to innovation and S&T policy and worth more than €12m - were executed between 2010 and 2011 in Ukraine. Ukrainian institutes participate in EUREKA, ERAnets and FP7 initiatives. All these programmes are very important for the country, as Ukrainian scientists have the opportunity to access European research consortia which conduct high-quality research.

Although Ukrainian statistics do not provide data on the distribution of international projects with other countries, it is evident that the EU plays an important role in international co-operation between foreign and Ukrainian researchers. There are five main forms of co-operation:

- FP7 projects
- Joint projects within bi-lateral agreements between Ukraine and individual EU countries
- Multilateral agreements with strong EU participation, such as the agreement on STCU functions

- Agreements between Ukrainian and EU institutes
- Individual participation of Ukrainian researchers in projects based in EU countries

As an example, it could be mentioned that two Ukrainian institutes have taken part in the EraWide Programme since 2010; two further institutes joined the Programme in 2011. Ukrainian organisations, including research institutes, also took part in the ENPI Programme[50]. However, research is not one of the main priorities in the country's strategy for ENPI at present, so the scientific component of such projects is currently limited.

The Research Framework Programmes, which bring together research organisations from EU member-states, is one form of co-operation that has become available for Ukraine since the early 1990s, during the Third Framework Programme (FP3), when an agreement for partnership and collaboration was signed between Ukraine and the EU. As an ENP country, Ukrainian participants in FP7 projects can be funded by the Framework Programme.

Data on distribution of Ukrainian applications and *projects awarded* projects is presented in Table 4.1.

The success ratio for applications to the FP7, measured by the number of entities granted funding in relation to the number of evaluated entities (for Ukraine 18.04%) is similar to that for other EECA countries and did not differ significantly from the average for the whole FP7 (22.58%) and in par with the new EU members (18.70%).

Data from Table 4.1 shows that Ukrainian scientists were more successful in Euratom and Capacities (INFRA). Despite the highest level of success being related to the Network of Excellence (100%), it only had one (successful) application (Table 4.2).

[50] http://www.enpi-info.eu/countryeast.php?country=62

Table 4. 1: Ukrainian participation in FP7

		All submitted		Mainlisted			Success Rate: applicants in mainlisted proposal / applicants in all submitted proposals
Proposal SP Description2	Proposal Programme	Number of Proposals	Number of Applicants	Number of Proposals	Number of Applicants	Proposal Total Cost	
Not_Available	N/A	2	2				
SP1-Cooperation	ENERGY	55	58	7	9	35.223.497	15,52%
SP1-Cooperation	ENV	86	141	17	28	147.218.270	19,86%
SP1-Cooperation	HEALTH	43	49	7	7	61.073.680	14,29%
SP1-Cooperation	ICT	75	87	8	10	7.807.077	11,49%
SP1-Cooperation	KBBE	86	105	12	21	51.677.055	20,00%
SP1-Cooperation	NMP	61	83	10	14	35.294.671	16,87%
SP1-Cooperation	SEC	17	21	2	3	6.165.550	14,29%
SP1-Cooperation	SP1-JTI	1	2				
SP1-Cooperation	SPA	74	128	10	12	139.623.220	9,38%
SP1-Cooperation	SSH	103	105	7	7	21.873.162	6,67%
SP1-Cooperation	TPT	65	87	16	20	58.538.032	22,99%
SP2-Ideas	ERC	16	19				
SP3-People	PEOPLE	286	359	71	88		24,51%
SP4-Capacities	INCO	109	164	16	24	18.358.792	14,63%
SP4-Capacities	INFRA	14	26	6	16	105.574.044	61,54%
SP4-Capacities	REGIONS	8	22	2	3	5.931.853	13,64%
SP4-Capacities	SiS	7	8	2	3	1.803.859	37,50%
SP4-Capacities	SME	43	61	2	2	3.581.119	3,28%
SP5-Euratom	Fission	20	24	11	13	57.370.729	54,17%
SP5-Euratom	Fusion	1	1				
	Sum:	**1.172**	**1.552**	**206**	**280**	**757.114.610**	**18,04%**

Source: FP7 database, 2012

Table 4.2: Ukraine Contract type of the FP7 projects with country's participation

Proposal Sub Funding Description	Number of proposals submitted	Number of proposals mainlisted
Collaborative project for specific cooperation actions dedicated to international cooperation partner countries (SICA)	66	13
Collaborative project (generic)	108	20
Collaborative Project targeted to a special group (such as SMEs)	16	1
Combined Collaborative Project and Coordination and Support Action	4	2
Coordinating action	84	27
Industry-Academia Partnerships and Pathways (IAPP)	18	3
Initial Training Networks (ITN)	33	2
Integrating Activities / e-Infrastructures	9	3
International Incoming Fellowships (IIF)	90	9
International Outgoing Fellowships (IOF)	4	1
International Research Staff Exchange Scheme (IRSES)	141	56
Large-scale integrating project	87	10
Network of Excellence	1	1
Research for SME associations/groupings	21	1
Research for SMEs	21	1
Small or medium-scale focused research project	263	29
Small or medium-scale focused research projects INFSO (STREP)	43	1
Supporting action	143	26
Other	20	
Sum:	1 172	206

Source: FP7 database, 2013

The impact of the participation in the EU FPs is definitely positive, as Ukrainian scientists receive valuable new experience and knowledge, and strengthen their contacts with western partners. On the other hand, this impact is limited as the number of participants is not high. Co-operation between Ukrainian and EU researchers remains relatively low. Additional support from the Ukrainian government for the promotion of FP activities is needed as well

as additional links between Ukrainian researchers and their EU counterparts; to forge partnerships in future projects. Support for capacity- building measures in research and innovation through ENPI could help in this regard. As a non-EU member, Ukraine cannot participate (at least, as a leading partner) in some FP-related initiatives. Another problem is that existing internal taxation practices do not support international project implementation, despite there being some clauses in EU-Ukraine agreements on special financial conditions for R&D projects. This creates serious barriers to co-operation.

There is no direct influence of the EU Programme on priority-setting in Ukraine, although the Ukrainian policy-makers study the content of the FPs attentively and the results of these studies are used to formulate research agendas in different ministries and academies[51].

4.3.2 Bi- and multilateral agreements with EU countries

Ukraine has bilateral agreements on cooperation in R&D with 20 EU countries. Some of these agreements form parts of broader agreements between Ukraine and particular countries. The country pays special attention to co-operation with the largest EU states, such as Germany, France, UK; and with neighbouring EU countries (Poland, Hungary, Slovakia, Romania). These agreements open the way for implementation of different types of bilateral scientific projects and programmes. However, as was mentioned above, lack of financial resources from the Ukrainian side and some internal rules for tax regulation within the country makes it difficult to develop this type of cooperation effectively.

There are a number of bilateral agreements targeted towards research organizations. One example is the Association of Technical Universities Russia-Ukraine-European Union, which was established in the mid-2000s to develop an integrated training system for specialists, to help to create Western-style techno parks in technical universities, and to establish working contacts between researchers in the EU, Ukraine, and Russia. Another initiative aims to establish several Strategic Planning Centres in Technical Universities throughout Ukraine, with the goal of improving management at the university level in different regions of Ukraine, namely: Kharkov, Odessa, Dnipropetrovsk, Ternopil and Kiev (*Kyiv)*.

As a rule, each partner has to provide financial resources for its part in joint research projects. In some EU-sponsored programmes, Ukraine can participate without making financial contributions; however, the number of such programmes is limited.

Different ministries and state agencies involved in financing R&D - such as the Ministry of Education and Science, and the National Space Agency – have announced their intention to further develop their contacts with EU institutions. However, the problem is that in practical terms the Ukrainian state could do much more to stimulate co-operation with the EU. Very often Ukraine cannot pay the country's contribution to international scientific organizations. This threatens participation in joint projects or international conferences by Ukrainian scientists.

Ukrainian scientists are actively working with foreign institutions on an individual basis, as visiting scholars.

A number of information points, aimed at stimulating co-operation with the EU, were created in the country. The Ministry of Education, Youth and Sports has created a National Information Point of Ukraine, which contains useful information on EU-Ukraine partnership in research and development (*http://www.fp6-nip.kiev.ua/*).

[51] Zinchenko N. S. Ukraine in the EU Framework Programmes: Experience and Perspectives. – Problemy Nauki, 2013, N. 2, pp. 13-18 (in Ukrainian)

4.4 COOPERATION WITH NON-EU COUNTRIES OR REGIONS

4.4.1 Main Countries

As of 2012, Ukraine has bilateral agreements for co-operation in S&T and education with 30 non-EU countries as shown below.

Table 4.3 Distribution of bilateral agreements between Ukraine and Non EU-countries in the area of S&T and education, 2012

Countries, regions	Number of bilateral agreements	Share in the total number of agreements, %
CIS countries (former Soviet)	28	48.2
Pacific region countries	7	12.1
Middle – East and African countries	8	13.7
North and South American countries	10	17.3
Other countries	5	8.7
Total	58	100%

Source: S&T in Ukraine in 2013. - Kyiv: State Agency for Science, Innovation and Informatisation, 2013

The table above shows that former Soviet countries are among Ukraine's priorities. However, co-operation within these agreements is not very active. The Average level of project financing from the Ukrainian side does not exceed € 10,000 (UAH100,000) per year. The Ukrainian state cannot provide proper financing for bilateral R&D projects, although competitions for joint projects are announced almost every year. Traditionally, Ukrainian scientists have strong contacts with partners from the Soviet Union. They not only have common research interests but also in some cases friendly personal relations.

Many Ukrainian institutes still preserve strong ties with their Russian partners, particularly in the technical sphere. Ukrainian and Russian researchers are currently working together on projects such as helicopter engines, missiles, gas transportation, and nuclear energy improvements. These ties are often based on cooperation in production in such sectors as space, aviation, locomotives and so on. Another reason for cooperation is the similarity of problems such as, for example, the problem of nuclear contamination after the Chernobyl explosion.

The USA has become an important partner in the last two decades. Americans are especially active in conversion of military-related R&D to civilian R&D. They have initiated several different programmes, such as CRDF or STCU (along with the EU and some other partners). The American government also supports some research-oriented USAID programmes.

Co-operation with China and other Asian countries is actively developing.

In general, it is possible to conclude that co-operation with Russia in R&D (especially in development) remains very important for Ukraine, while co-operation with the EU is of secondary importance. However, the latter has become more diversified and important in recent years. The level of co-operation between Ukraine and the EU remains relatively low, in comparison with the size of research communities. In many cases, formal agreements have no proper financial support from the side of Ukrainian authorities.

4.4.2 Main instruments

Bi-lateral agreements and joint projects are the main instruments of cooperation between Ukraine and other countries. However, financial resources for their implementation are scarce. As a rule, government asks ministries or agencies to find financing for bilateral projects from the general R&D funds of the relevant ministry or agency. Sometimes, the government provides money for specific bilateral research projects, but not on a regular basis.

4.5 OPENING UP OF NATIONAL R&D PROGRAMMES

As a general rule, national programmes are closed to foreigners, if they will not bear their own expenses. Joint calls with different foundations and institutions are popular but, again, foreign participants have to cover their own expenses.

4.6 RESEARCHER MOBILITY

4.6.1 Mobility schemes for researchers from abroad

There are no special funding schemes for supporting non-nationals to work in R&D in Ukraine. Recently some steps have been taken to encourage Ukrainian nationals to return, by engaging them in the creation of *key* national laboratories. The first one, on biotechnology, was created at the end of 2010. However, financial incentives aimed at attracting expatriate scientists to return are still weak.

4.6.2 Mobility schemes for national researchers

There are no national schemes to promote international mobility for national researchers but also no barriers at national level to Ukrainian scientists participating in international exchange or training programmes, However, Ukrainian scientists returning from overseas very often have problems inobtaining positions of similar status to those which they held abroad.

5 CONCLUSIONS

The analysis presented in this report has to be seen in the light of the specifics of the Ukrainian situation, and especially of its economy and research system.

Ukraine urgently needs not only a serious transformation within the S&T system, but also important changes in its legal system. The introduction of adequate legal protection for intellectual property rights, especially in foreign countries, is of critical importance for individual researchers, S&T institutes and science-oriented SMEs. This is also very important for foreign companies seeking to engage in direct investment or some other form of business alliance, and for domestic companies that co-operate with them. The development of facilities for the provision of venture capital needs to be a higher priority in Ukraine. However, this development is of equal potential importance for S&T organizations, and for companies involved in international business co-operation. The introduction of new forms of co-operation between Western companies and research centres, on the one hand, and local research organizations and individual researchers, on the other, would be very useful in selected areas. This could help to both save resources and to obtain new results quicker.

Ukrainian education, research and innovation policy is governed by different strategic documents and legal acts which, as they still contain different tasks and goals, need to be harmonised. New forms of co-operation within the knowledge triangle have to be developed, to increase its effectiveness –which remains low.

It is an asset that Ukraine has a number of different R&D agreements with other countries. Ties with Russia are still especially strong in technical sciences, as the industrial sectors of two countries were closely interrelated in the past. At the same time, Ukraine has to further develop its cooperation in R&D with the EU and other developed countries, to maximise its potential and to integrate into the world research system.

6 REFERENCES

Enhance Innovation Policies, Strategies and Regulation in Ukraine. EuropeAid Project 127694/C/SER/UA (2011). Kiev. Fenix, vol.3, - 74 pages

EU-Ukraine Action Plan (2005) (Part 6 of the Plan, Section 4.2 Towards ERA). http://esbs.kiev.ua/en/eu-ukraine-cooperation/plan-diiy-ukrayina-yes

Final Report on the EU-sponsored BRUIT Project (on Trendchart for Russia and Ukraine in 2007-2008) (2008)
http://www.proinno -europe.eu/index.cfm?fuseaction=page.display&topicID =52&parentID=52

Griga V. (2010) Theoretical and Practical Aspects of Utilization of Research Results of the National Academy of Sciences of Ukraine in the National Economy. – Kyiv: Fenix (in Ukrainian)

Ilchenko M.Yu., ed. (2010) Nauka v Universitetah (Science in Universities) – Kyiv: TOV 'VD EKMO'. (in Ukrainian)

Information on the execution of the main provisions of the Law of Ukraine "On scientific and technical activity (2010) / Letter of the MES of Ukraine to the Committee of the VRU on Science and Education on 20.05.2010,№1/10-1225-25p.»

Kvasha T.K. (2010) Foresight studies in Ukraine. - Abstracts of the International Symposium 'Actual Problems of S&T and Innovation Policy in the Light of Creation of the European Research Area: Experience and Perspectives' - Kyiv June 16-17, 2010. – Kyiv, Feniks, - P. 353-357 (in Ukrainian)

Krasovska O., Yevtukhova T., Legenko Yu., eds. (2012) Regional Innovation Systems: Experience of Developed Countries and Perspectives of its Utilization in Ukraine –Kyiv: TSNTEI, 253 p. (in Ukrainian)

OECD Main S&T Indicators (2011), N. 1

On the results of audit of the effectiveness of the budget funding of state goal-oriented S&T programmes, supervised by the Ministry of Education and Science in 2008 (2009) Kiyv: Rakhunkova Palata, –
http // *www.ak-rada.gov.ua/contro/main/uk/publisharticle/16722660* (in Ukrainian)

Report on Competitiveness of Ukraine. Towards Economic Growth and Prosperity. (2009) Foundation of Effective Management. – Kyiv: FEM (it is also available at *www.feg.org.ua*) (in Ukrainian)

Scientific and innovation activities in Ukraine. Yearbook (2012). – Kyiv: State Committee of Statistics of Ukraine (in Ukrainian)

State Law of Ukraine On Priorities in Science and Technology Development N2519-VI on September 9, 2010 (*http://www.president.gov.ua/documents/12343.html*) (in Ukrainian)

S&T in Ukraine in 2013. (2013) Kyiv: State Agency for Science, Innovation and Informatisation (in Ukrainian)

Strikha M., Shovkaluk V., Borovich T., Dutchak Zh., Sedov A. (2009) Information and Analytical Materials of the Ministry of Education and Science to the Parliamentary Hearings on the Topic :'Strategy of Innovation Development of Ukraine for 2010-2020 in Conditions of Globalizations. – Kyiv: MON (in Ukrainian)

Supel J. (2010) Ukrainian participation in FP7: a statistical approach.- Second monitoring report to the EU-sponsored EropeAid "Joint Support Office Ukraine's integration in EU research area". – December 2010. – (unpublished paper)

Vashulenko O.S., Gryga V.Yu., Yegorov I. Yu. (2010) Scenarios of development of S&T manpower in Ukraine on the base of statistical models. – Nauka y naukoznavstvo. - №1. – p. 28-39 (in Ukrainian).

Weingart W. (2009) Publication activities of researchers in the post-Soviet countries. – Paper to the EU-sponsored project MobilizingSSH – Uppsala, Sweden, April 22-23, 2009

White Paper on Opportunities and Challenges in View of Enhancing the EU Cooperation with Eastern Europe, Central Asia and South Caucasus in Science, Research , and Innovation (2011). EU IncoNet EECA project
http://www.internationales-buero.de/de/45.php

Yegorov I. (2009) Post-Soviet Science: Difficulties in the Transformation of the R&D systems in Russia and Ukraine- Research Policy – May, vol. 38, issue 4, p. 600-609

Yegorov I. (2009) Social sciences and humanities in Ukrainian society: the difficulty of integration to the international structures - in Kuhn M., Weidemann D., eds. Internationalization of Social Sciences: Asia- Latin America- Middle East- Africa- Eurasia. – New Branswuik and London: Transaction Publishers, - p. 307-322

Zinchenko N. S. (2013) Ukraine in the EU Framework Programmes: Experience and Perspectives. – Problemy Nauki, - N. 2, pp. 13-18 (in Ukrainian)

7 LIST OF ABBREVIATIONS

BERD	Business expenditures on R&D
CIS	Commonwealth of Independent States
CRDF	Civilian Research and Development Foundation
ENP(I)	European Neighbourhood Policy (Initiative)
ESF	European Social Funds
ERDF	European regional development fund
EU	European Union
FP	European Framework Programme for Research & Technology Development
FTE	Full Time Equivalent
GERD	General expenditures on R&D
GBAORD	Government Budget Appropriations or Outlays on R&D
HEI	Higher education institutions
HES	Higher education sector
ICT	Information and communication technologies
IPR	Intellectual property rights
NAS	National Academy of Sciences of Ukraine
PRO	Public Research Organisations
R&D	Research and development
SF	Structural Funds
S&T	Science and Technology
SCS	State Committee of Statistics (of Ukraine)
SFRBR	State Fund for Researchers in Basic Research
STCU	Scientific and Technological Centre of Ukraine
USPTO	US Patent and Trademark Office
USSR	Union of the Soviet Socialist Republics
VAT	Value-added tax