РОЗДІЛ ІІ
ЕВОЛЮЦІЯ ЄВРОПЕЙСЬКИХ КУЛЬТУРНО-ІСТОРИЧНИХ ЦІННОСТЕЙ ЯК ФАКТОР РОЗВИТКУ ЄВРОПЕЙСЬКОЇ ЦИВІЛІЗАЦІЇ

УДК 001.895 + 339.94 (061.1 ЄС + 477)

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THE PROBLEMS AND PROSPECTS OF THE UKRAINE-EU SCIENCE AND TECHNOLOGY COOPERATION AS A PART OF EUROPEAN VALUES

Science and technology are the part of European values. The Ukraine-EU science and technology cooperation is based on the agreement signed on 4 July 2002. The current levels of EU-Ukraine cooperation is carried out through the Program for Research and Technological Development (Horizon 2020) and through Ukrainian national programs and bilateral activities with EU member states. Research and innovation cooperation will be developed as strategic EU-Ukraine priorities through the Eastern Partnership.

Keywords: *science, technology, modernization, international cooperation, research, innovation, European Union, Ukraine.*

Васильєв О. А. Проблеми і перспективи науково-технічного співробітництва України і ЄС як частина європейських цінностей. Наука і техніка є частиною європейських цінностей. Науково-технічне співробітництво України і ЄС базується на угоді, підписаній 4 липня 2002 р. Сучасна співпраця виконується відповідно до Програми дослідницького і технологічного розвитку (Горизонт 2020), національних українських програм і як двостороння діяльність з державами-членами ЄС. Дослідницька та інноваційна кооперація розвиватиметься як стратегічні пріоритети співробітництва ЄС-Україна через Східне Партнерство.

Ключові слова: *наука, техніка, модернізація, міжнародне співробітництво, дослідження, інновації, Європейський Союз, Україна.*

Васильев А. А. Проблемы и перспективы научно-технического сотрудничества Украины и ЕС как часть европейских ценностей. Наука и техника являются частью европейских ценностей. Научно-техническое сотрудничество Украины и ЕС базируется на соглашении, подписанном 4 июля 2002 г. Современное сотрудничество выполняется согласно Программе исследовательского и технологического развития (Горизонт 2020), национальным украинским программам и как двухсторонняя деятельность с государствами-членами ЕС. Исследовательская и инновационная кооперация будет развиваться как стратегические приоритеты сотрудничества ЕС-Украина через Восточное Партнерство.

Ключевые слова: *наука, техника, модернизация, международное сотрудничество, исследования, инновации, Европейский Союз, Украина.*

The European Union's fundamental values are respect for human dignity and human rights, freedom, democracy, equality and the rule of law [1; 2]. These values unite all the member states, no country that does not recognise these values can belong to the Union. The main goal of the European Union is to defend

these values in Europe and promote peace and the wellbeing of the citizens. For its part, the European Parliament seeks to ensure that these values are realised in the EU legislation. The EU member states are pluralistic. The European Union works for social equality. It develops social security and tries to protect the weakest. It seeks to prevent social exclusion and discrimination. All these fundamental values are defined in the Treaty of Lisbon (2009) [3].

Through the ages science and technology have been the part of European values. In 1957 Belgium, France, Italy, Luxembourg, the Netherlands and West Germany signed the Treaty of Rome, which created the European Economic Community (EEC) and established a customs union. They also signed another pact creating the European Atomic Energy Community (EURATOM) for cooperation in developing nuclear energy. Both treaties came into force in 1958, but the tradition of scientific research in Europe is much older and can be traced back to the scientific revolution. Europe is home to some of the world's oldest universities, such as the University of Bologna. The oldest European universities were, at the time of their foundation, more centered on philosophy, theology and law than on science. Europe's achievements in science and technology have been significant and research and development efforts form an integral part of the European economy. Europe has been the home of some of the most prominent researchers in various scientific disciplines, notably physics, mathematics, chemistry and engineering. Scientific research in Europe is supported by industry, by the European universities and by several scientific institutions. The raw output of scientific research from Europe consistently ranks among the world's best.

The EU's modernization, as the global socio-political thought, is a prerequisite for the establishment of a new world civilizational change. It is based on a definition that modernization is the main law of social constant change, complexity of political, economic, government agencies and other features according to the needs of society's effective functioning. The theory of modernization has gone through several stages of development, acquiring new characteristics and trends that have made social, political, scientific, technical and managerial achievement. The current phase of civilization modernization called postindustrial or postmodern. Its basis is the primary role of fundamental knowledge as the core around which new technologies, economic and social progress of society are created. Its main features are changing the system values (the desire to discover man's talents and abilities), increasing the role and value of «human capital», understanding high price of intelligence. The formation of high management culture, the growing importance of information change human beings towards culture, education, spirituality and more [4].

International cooperation is carried out on the basis of intergovernmental and interdepartmental agreements on scientific and technical cooperation, into which along with the rights and obligations of the parties concrete types of activities are included. Ukraine has signed agreements on scientific-technical cooperation with many countries. The vector direction of international cooperation has the widest range which includes the European Union. So nowadays Ukraine-EU science-technology cooperation needs more profound study.

Large-scale reforms being carried out in the Europian Union in order to introduce technology, innovations and scientific achievements in all spheres of the national economy. They are accompanied by the expansion of not only political and economic international relations but also the development of scientific and technical ties with foreign countries, leading industrial and scientific centres. There has been the internationalization of research, the exchange of scientific knowledge and technology. Work aimed to improve the skills of scientific personnel is also underway. The enhancement of international scientific and technological partnership in terms of deployment of innovative activity in the EU is an objective necessity, a result of international division of labor and scientific progress in the process of which new forms of production and scientific relations must be created [5].

The importance of the development of industrial as well as scientific and technical cooperation as its component was proclaimed at the Conference on Security and Cooperation in Europe held in Helsinki in 1973 with the participation of 33 countries. The legal safeguard of international relations in this sphere of Ukraine, the main principles and provisions of interaction are enshrined in the national legislation. Areas of activities and plans for implementation are defined in the political and policy documents. Forms and types are developed in the international treaties of Ukraine. International cooperation in the field of science is aimed at solving theoretical and experimental problems of fundamental and applied science, promoting the development of technological processes, training staff, safeguarding the use of scientific and technological progress [6].

The Ukraine-EU Science and Technology cooperation is based on the Ukraine-EU Agreement on Science and Technology Cooperation signed on 4 July 2002. Under the terms of this Agreement the Joint Committee on S&T Cooperation was established. First meeting took place in Brussels on 23 November 2011. Both sides provided information on current developments in research and innovation policy and programmes in the EU and Ukraine respectively. Review was provided on the current levels of EU-Ukraine cooperation in research and innovation. Discussing activities carried out through the EU's Seventh Framework Programme for Research (FP70 [7] and through Ukrainian national programmes and bilateral activities with EU member states. Both sides shared information on the health, ICT and nanotechnology/materials research, with a view to promoting and potentially increasing future cooperation in these areas, and agreed to work to identify some areas of research and innovation cooperation, which will be developed through future meetings of the Joint Committee, as strategic EU-Ukraine priorities on a bilateral or bi-regional level through the Eastern Partnership. Nowadays regular consultations are continued and bilateral meetings are held [8].

Ukraine is a part of the Eastern Partnership region of the European Neighbourhood. With this region a development towards a «Common Knowledge and Innovation Space» is envisaged. To achieve that the Commission will intensify cooperation with Ukraine and will support better networking and co-ordination between Ukraine and the EU in the setting and synchronization of research

priorities. With a view to promoting preparation of Ukraine's research community for the Horizon 2020, the Commission supports Ukraine in building up research capacity, promotes the increased collaboration between Ukraine's and EU's researchers and research organisations and strengthens the dissemination of information on Horizon 2020 to Ukraine. The Commission also supports special information events on Horizon 2020 [9].

A special kind of agreements includes programmes for scientific and technical cooperation. This is relatively new form of cooperation and partnership in the field of science and technology. Standards set forth in these treaties are for the future. They also set the parameters of conduct in the field of using achievements in this area, thus fulfilling the role of the international planning of productive relations in this sphere. The programmes, as a rule, define priority areas of cooperation and main stages of implementation. Moreover, a number of specific projects can be included into them. Today there are the participation of the scientific organizations and Ukrainian scientists in joint and regional scientific projects as well as in international conferences and events held abroad, working meetings and consultations, internships in foreign research centers, etc.

The European Commission announced an €8.1 billion euro package of calls for proposals under the EU's Seventh Framework Programme for Research (FP7). This was an important part of the Commission's commitment to work for growth and jobs in Europe. FP7 was the European Unions Research and Innovation funding program for 2007-2013. The current programme is Horison 2020 but there are many projects funded under FP7 which are still running.The calls address key concerns faced by Europeans where action at EU level is essential. €4.8 billion will be invested in thematic areas, with specific priorities to preserve oceans and water, better use of raw materials, efficient energy, promote efficiency in the processing of biological resources, develop smart cities and tackle issues such as public sector reform, brain research and anti-microbial resistance. Making Europe a destination for world-class researchers is another key priority. The European Research Council will invest over €1.7 billion in the best researchers and additional €963 million will support mobility through «Marie Curie Actions» [10].

The current EU programmes with options for RTD cooperation with Ukraine are as follows [11]:

– FP7 (Seventh Framework Programme);
– Erasmus Mundus;
– Tempus;
– Jean Monnet Programme under the Lifelong Learning Programme;
– INSC (Instrument for Nuclear Safety Cooperation) funded through ENPI (European Neighborhood and Partnership Instrument);
– ENPI CBC (Cross-Border-Cooperation) Poland-Belarus-Ukraine Programme;
– Hungary-Slovakia-Romania-Ukraine ENPI Cross-border Cooperation Programme 2007-2013;
– Joint Operational Programme Romania-Ukraine-Republic of Moldova 2007-2013;

– Black Sea Basin Joint Operational Programme 2007-2013;
– INOGATE Interstate Oil and Gas Transport to Europe;
– Nuclear Safety Co-operation Instrument (NSCI);
– South East Europe Programme;
– Central Europe Programme.

The following bilateral policy agreements between the EU and Ukraine constitute the background for policy dialogue:

– Partnership and Cooperation Agreement between the European Communities and their member states, and Ukraine;

– Protocol to the Partnership and Cooperation Agreement establishing a partnership between the European Communities and their member states of the one part, and Ukraine of the other part;

– Agreement on Renewing the Agreement on Cooperation in Science and Technology between the European Community and Ukraine;

– Agreement for Cooperation between the European Atomic Energy Community (EURATOM) and the Cabinet of Ministers of Ukraine in the field of controlled nuclear fusion;

– European Atomic Energy Community (EURATOM) and the Cabinet of Ministers of Ukraine for Cooperation in the Peaceful Uses of Nuclear Energy;

– ENP European Neighborhood Policy – EU-UKR Action Plan;

– Agreement between EC and Ukraine on GALILEO and Air Transportation;

– Agreement to Establish a Science and Technology Center in Ukraine (STCU).

There are many FP 7 notable projects for Ukraine [7]**,** for example, the InnoPolicy (Enhance Innovation Strategies, Policies and Regulation in Ukraine) project. This project was implemented in Ukraine between 2009 and 2011 in order to support the formulation of the Ukrainian innovation and research policy on the governmental and regional levels, to support improvement of the regulatory and legislative environment for research, innovation and intellectual property rights in Ukraine and to bring the Ukrainian legislation in compliance with the best European practices. The project also aimed to support state departments in Ukraine that are dealing with innovation and IPR issues.

The PROMITHEAS 4 project [12] aims at the development and evaluation of mitigation/adaptation (M/A) policy portfolios and the prioritization of research needs and gaps for 12 countries (Albania, Armenia, Azerbaijan, Bulgaria, Estonia, Kazakhstan, Moldova, Romania, Russian Federation, Serbia, Turkey and Ukraine) characterized as emerging economies. The overall strategy is based on development, implementation, evaluation and knowledge transfer towards scientists and decision makers of both public and private sectors from emerging economies. Scientific research needs and gaps will be identified and listed in the inventory.

The IncoNet EECA – S&T project [13] addressed STI policy stakeholders from the EU, its member states and associated countries (MS/AC) and Eastern European/Central Asian (EECA) countries. Its aim was to establish an STI policy

dialogue platform between the EU MS/AC on the one side and 12 Eastern European and Central Asian countries (including Ukraine) on the other side. To achieve its goals the project organised five successful policy stakeholders' conferences and undertook comprehensive analytical work, which fed into a White Paper on chances and challenges for future cooperation. All project results continue to be available from the project's website.

There are exemplary thematic EU-Ukraine cooperation projects: LCOIR-UA (Low-Carbon Opportunities for Industrial Regions of Ukraine**)** project [14] aims at encouraging and facilitating the practical implementation of activities on clean coal technology and technology of carbon capture and storage (climate technologies) in Ukraine, as well as contributing to initiating of cooperation in this domain between Ukraine and the European Community. PESI (Pan-European species-directories infrastructure) project provides standardised and authoritative taxonomic information by integrating and securing Europe's taxonomically authoritative species name registers and nomenclators (name databases).

COMPOSITUM (Hybrid Nanocomposites and their Applications**)** project [15] aims to establish or reinforce long-term research co-operation through a coordinated joint programme of exchange of researchers for short periods, and in particular strengthening European position in the research activities related to nanosciences, nanotechnologies and nanomaterials. It also supports the strategic objective of the PEOPLE programme to make Europe attractive to the best researchers from outside the EU.

The promotion of bilateral cooperation with Ukraine is supported through BILAT-UKR*AINA project [16] which started on 1 September 2012. The major objectives of it are to support the institutional dialogue on science, technology and innovation (STI) policy between the European Commission, the EU member states/associates countries and Ukraine, provide analytical input to the dialogue at the Joint Science and Technology Cooperation Committee (JSTCC), and ensure practical follow-up and sustainability. BILAT – UKR*AINA foresees in a flexible manner pilot activities to facilitate the implementation of the joint EU-Ukraine STI Roadmap; promotes research, technology development and innovation (RTDI) cooperation opportunities to support the creation of networks and the participation in joint projects; monitors and analyses innovation and research cooperation expressed in co-publications, scientific and educational networks and in terms of joint projects; analyses, promotes and monitors the participation of EU researchers in Ukrainian science and technology state programmes; secures the outreach of the project to interested parties who are not consortium members and increases awareness about the assets of RTDI cooperation with Ukraine.

Horizon 2020 includes following sections [17]: Excellent Science; European Research Council; Future and Emerging Technologies; Marie Skłodowska-Curie Actions; Research Infrastructures. Projects are expected to be driven by industrial requirements, to be well balanced between industry and academia, and to include a demonstration and validation phase with realistic use cases.

The innovation actions will connect innovators across different value chains in two themes:

– Towards platforms and ecosystems: support will go to the development of reference architectures and platforms for open and cooperative CPS;

–Towards a «smart everywhere» society: the objective is the establishment of European networks of embedded systems design centres, helping businesses to improve the quality of their products and services with innovative embedded ICT components and systems.

For Ukraine it is very important an EU-funded MODEXTREME project [18] that has developed new modelling tools to better forecast the impact of extreme weather on agricultural production in Europe and beyond. It is important for protecting the global food supply. The growth of food staples such as maize or wheat is often affected by sudden spells of high or low temperatures. Being able to forecast more accurately how such weather changes affect yields will help decision-makers and the farming industry plan ahead to avoid food shortages.

Researchers from 14 countries, including scientists from Ukraine, collaborated in the project to improve the accuracy of biophysical models that can simulate the response of arable crops, grasslands and trees to adverse weather shocks. Modelling approaches were evaluated for a range of crop-and-country combinations. These combinations included, among many others, wheat in Spain and Ukraine, maize in Germany and barley in Poland. For each combination, three key moments in the crop cycle were identified for forecasting purposes. Food security information from MODEXTREME's modelling solutions is expected to improve yield estimates in a variety of agricultural systems across the world. Those charged with guaranteeing food production now have advanced tools to help them prepare and implement agricultural policies which can reduce the social and economic impact of extreme weather events.

Europe has a strong market position in electronics, microsystems and embedded system. The objective is to reinforce this position. The European Institute of Innovation and Technology (EIT) [19] intends to be a new flagship research university for excellence in higher education, research and innovation. The initial concept for EIT was based on the example of the Massachusetts Institute of Technology (MIT) and its combination of world class education, research, and deep engagement in effective innovation processes. On 18 June 2008, Budapest (Hungary) was chosen by the EU nations to host the headquarters of the Institute.

The current bilateral interaction between the EU and Ukraine is based mainly on the programmes, which encompass projects in the spheres of biotechnologies & biomedicine, information & telecommunication technologies, nanotechnologies & new materials, energy & power resources, high energy physics & astrophysics. In Horison 20 there are 90 projects of Ukrainian scientists from 117 groups which since 2015 have obtained about €17 million [10].

There are the following S&T priorities in Ukraine for the period up to 2020 [20]:

– Enviromental and climate research, nature management;

- Agriculture and forestry;
- Industrial and production technologies;
- New materials;
- Energy efficiency, alternative energy;
- Transportation;
- Information and communication technologies;
- Biomedical research, treatment of wide-spread diseases.

Today legal framework contributing to the establishment and development of international contracts has been created. It includes many normative documents that define principles, areas, conditions for financing, tax support, forms and types of cooperation with Europian research centers, scientists and inventors.

The international scientific and technological cooperation between Ukraine and the European Union is the joint development of scientific and technical issues, the mutual exchange of scientific achievements, the experience and training of highly qualified specialists. Noting the importance of intensifying cooperation in this area with countries of the EU in the context of further development and modernization of the scientific sphere and innovative development of Ukraine it should be stressed that the past, present and future of Ukrainian science are integrally connected with political, economic and cultural development of the EU.

The programme for the development of innovative activities in Ukraine sets tasks on the study of international experience of introducing technologies, its adaptation to the needs of the production system and search for innovative solutions to the issues of the national economy. It is necessary to create joint laboratories, organizations, implement projects, programmes of cooperation and invite scientists from the EU in order to share experiences, send Ukrainian scientists for training in European centres and to exchange effective technologies.

Innovative firms in Ukraine benefit from EU-guaranteed loans. The European Investment Fund (EIF) [21] and ProCredit Bank Ukraine signed a loan guarantee deal that will offer small and medium-sized companies in Ukraine easier access to risk capital for the development of innovative ideas. The EU-funded deal will allow the bank to more securely enter into loan agreements with companies of below 500 employees as any potential losses on loans for innovative activities will be guaranteed by 50% by the EU under the loan guarantee scheme. Overall, the scheme is to generate a portfolio of €50 million in loans to innovative companies. This deal falls under the InnovFin SME Guarantee Facility, which is part of the new generation of financial instruments supported under Horizon 2020 (IP/14/670). Under this facility financial intermediaries are guaranteed against some losses incurred on the debt financing.

The current trends of globalization and integration are characterized by the extensive use of information technology; the formation of an innovative economy; the internationalization of research, development and knowledge-based production; the aggravation of global competition in world markets of investment, high technology products and services. There are changing traditional forms and mechanisms of international cooperation in science and technology. The role of a government in the regulation of these processes is increasing. The close

relationship of science and technology, foreign trade and economic policy is essential to overcome the existing economic crisis.

The major objectives of the Ukraine-EU Science and Technology Cooperation are: to support the institutional dialogue on science, technology and innovation (STI) policy between the European Commission, the EU Member States/Associates Countries and Ukraine, to provide analytical input to the dialogue at the Joint Science and Technology Cooperation Committee (JSTCC) and to ensure practical follow-up and sustainability.

Conclusions

1. Science and technology always have been the part of European values. Europe's achievements in science and technology have been significant and research and development efforts form an integral part of the European economy. Scientific research in Europe is supported by industry, by the European universities and by several scientific institutions. The output of scientific research from Europe consistently ranks among the world's best.

2. The recommendations of the European Commission were developed to help Ukraine to improve its performance in research and innovation. Recommendations are made on a range of issues including reforming the STI system to boost efficiency and impact; increasing government investment in R&D; revamping STI institutions, funding and procedures, and improving international cooperation.

3. The Ukraine-EU science and technology cooperation makes great contribution to the participation of Ukraine in the global integration processes in the sphere of science, technology, high-tech industry; the country's transition to an innovative path of development; the entry of our country into the market of intellectual products; the increase of scientific potential; the ensuring of technological security.

4. According to the goals of Ukraine for the social and economic development of the country, the scientific branch as defining the economic development of the country, the condition and happy future of the people must enter scientific space of the European Union. Only relying on a strong scientific and engineering complex may be most real way for Ukraine to take its rightful place among economically developed states, to promote social approval-oriented, structure-innovative model of modernization.

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