

# On the Way to the European Research Area: Programmes of the European Union as Factor of the Innovation Development the Scientific Organization in Ukraine

Yuri Nikitin, Veronika Rukas

**Abstract**—Within the framework of the FP7 project "START" the cooperation with European research centres has had a positive impact on raising the level of innovation researches and the introduction of innovations Institute for Superhard Materials of the National Academy of Sciences (ISM NAS) of Ukraine in the economy of Europe and Ukraine, which in turn permits to speeds up the way for Ukrainian science to the European research area through the creation in Ukraine the scientific organizations of innovative type.

**Keywords**—Programs of the EU, innovative scientific results, innovation competence of the staff, commercialization in business of industry of the Europe and Ukraine.

## I. INTRODUCTION

THE paces of development of the national economy at the present stage are determined by the innovation activity and depend primarily on the ability to apply new knowledge in the production process. In this innovation creates competitive advantage, becoming the main source of wealth of the country. In the ranking of countries on the Global Competitiveness Index in 2012-2013 Ukraine ranks 73 among 144 countries and is represented in Fig. 1 [1].

The Global Competitiveness Index includes a group of indicators of innovation. According to the WEF report, Ukraine in 2012 ranked 71 among 144 countries in the world subindex "Innovation", while in recent years there has been deterioration trend of the subindex components (Table I) [2].

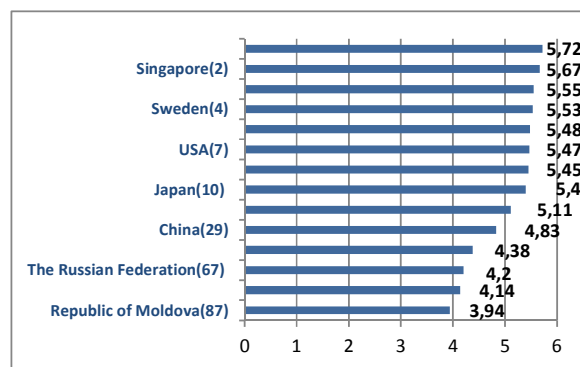


Fig. 1 Ranking of countries in the Global Competitiveness Index in 2012-2013

TABLE I  
COMPONENTS THE INNOVATION SUBINDEX OF THE COMPETITIVENESS  
INDEX OF UKRAINE, POINTS FROM 1 TO 7

	2008	2009	2010	2011	2012
Ability to innovate	3,8	3,7	3,5	3,4	3,3
Quality of research institutions	4,2	3,9	3,6	3,6	3,7
R&D expenses of companies	3,3	3,0	3,0	3,0	2,7
Interaction of educational institutions and industry in implementing of R&D	3,6	3,5	3,5	3,6	3,6
Purchase of high-tech products at the public funds	3,7	3,3	3,1	3,1	3,2
Availability of scientists and engineers	4,4	4,4	4,3	4,3	4,8
Number of patents for invention	1,3	0,5	0,4	0,3	0,4

Thus, during 2008-2012 the level of ability to innovate in Ukraine decreased, quality of scientific organizations worsened, costs for companies to carry out R&D and the volume of purchases by the state high-tech goods reduced. Also cooperation in research between educational institutions and industry, the number of registered patents for invention, security of scientists and engineers has a low level.

According to experts carrying out considerate researches, the innovation activity in Ukraine requires an intersectoral technological exchange, strengthening the companies' ties with universities and research organizations, the development of international scientific and technical cooperation, venture capital investment in new and innovative designs, developing

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of innovative infrastructure, wide application of information technologies [2].

Unfortunately, the competitiveness of Ukrainian enterprises remains low compared with companies in economically developed countries and a solution to this problem is connected with the complex innovation - technological upgrading of enterprises and increasing of their innovative activity [3].

The essence of improving enterprise innovation is the development of new products and the improvement of consumer qualities of products and improvement of their production technologies through commercialization of innovative results of research organizations [4].

At the same time, the scientific and technical potential of the scientific organizations of Ukraine quantitatively reduced: from 1255 units in 2011 compared to 1518 units in 1998 and 1510 in 2005. Number of scientists is rapidly decreasing: from 313 thousand in 1990 to 85 thousand in 2011. The percentage of fulfilled scientific and scientific - technical works in the country's GDP volume is too low - 1.36% in 1990, 0.98% in 2006 and 0.79% in 2011. All these factors have a negative impact on the overall level of innovativeness of the economy of Ukraine [5].

However, on the other hand an increase in the accumulation of human capital to implement innovations is observed. So, in terms of innovation performance that characterizes the creation of special conditions to foster innovation performance, in 2012, Ukraine ranked 14th place among 141 countries studied. For comparison, in 2011, Ukraine took 40th place, and in 2010 the 54th place, which is a significant increase in the efficiency of innovation activity in Ukraine at the moment [6].

In 2012 number of scientists who have travelled outside of Ukraine aimed at training, teaching, professional development increased by 9.1% and amounted to 4.1 thousand people. In order to participate in international workshops and conferences 10.7 thousand trips abroad has been made and 2,5 thousand such activities were carried out by scientific organizations in Ukraine.

Number of grants received for scientific works from international funds, compared with 2011 increased by 7.4% and made 1855, including collective by 4.6% (846), the individual - by 9.9% (1009). Total number of scientists who participated in grants and projects, including the EU framework programs, made 5.3 thousand people (Fig. 2) [7].

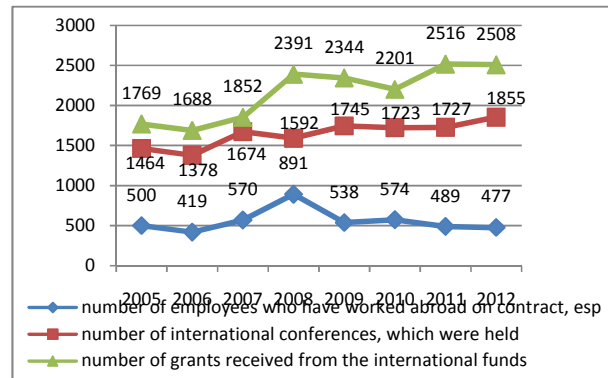


Fig. 2 International cooperation of scientific organizations of Ukraine

Despite the reduction in the number of direct executors of research and scientific developments, the total number of publications is growing: from 345.3 thousand in 2010 and 354.7 thousand in 2011 up to 374.9 thousand publications in 2012, that based on the average number of 1000 employees - performers of research and development work it was 3384 printed publications (against 2812 in 2010 and 3033 in 2011). Of the total number of publications there is 6,4 thousand - individual monographs, 468 of which were published abroad, 201.9 thousand - in leading scientific journals, 21.3 thousand of which were printed in journals included in international databases and 17,3 thousand in textbooks and teaching materials (Fig. 3) [7].

The Seventh Framework Program for Research and Technological Development also contributes to the development of scientific and technological potential of Ukraine by integration of Ukrainian science into the European Research Area (ERA).

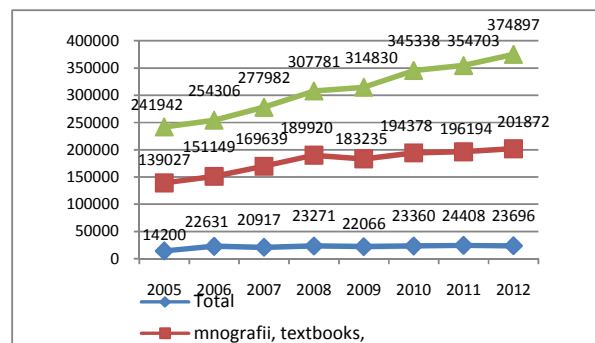


Fig. 3 Dynamics of published works of Ukrainian researchers

According to the main objectives of the Seventh Framework Program of the European Union: Strengthening the scientific and technological base and support of competitiveness by stimulating innovative research and development of scientific collaboration between researchers in Europe and partner countries through the formation of international research consortia and joint international projects [8].

Institute for Superhard Materials of the National Academy

of Sciences (ISM NAS) of Ukraine performing project FP7 «START», "Boosting of Ukraine-EU cooperation in the field of superhard materials" (contract number 295003), as the coordinator of an international consortium, confirms the important role of European Union programs to create innovative results of research, increase research and innovation competence of scientists contributing to the development of innovative type of scientific organizations.

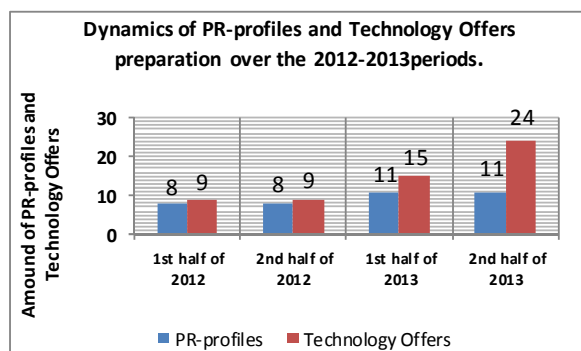


Fig. 4 Dynamics of the PR-profiles and Technology Offers preparation over the 2012-2013 periods

Under the "START" project "Strategy ISM- 2020", aimed at strengthening the status of ISM NASU as a research organization in Europe and the world by forming a scientific organization of innovation type, allowing to increase the volume of non-state research funding was formed.

With the support of the project «START» during period 2012-2013 period it was carried out a series of activities aimed at improving the competence of the employees innovative of ISM NAS of Ukraine: tours delegation to France and Poland, internships and job training for young scientists from Ukraine in France and Poland, scientific seminars, information days in Ukraine and Europe, intensive training courses for young scientists of ISM, etc.

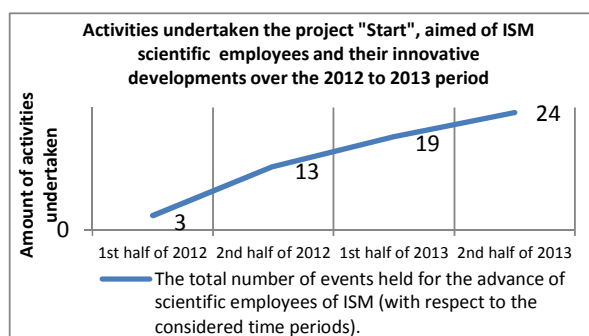


Fig. 5 Activities undertaken under the project "Start", aimed at advance of ISM scientific employees and their innovative developments over the 2012 to 2013 period

Under the project «START» the "PR Research Profiles" (summary of research departments and laboratories), which were used to search for partners - EU research centres to

create new scientific consortia and project proposals of the European Union were formed on the one hand and the "Technology Offers", which are form of investors seeking to commercialize patented innovative scientific results ISM NAS industry in Europe and Ukraine on the other hand were also formed.

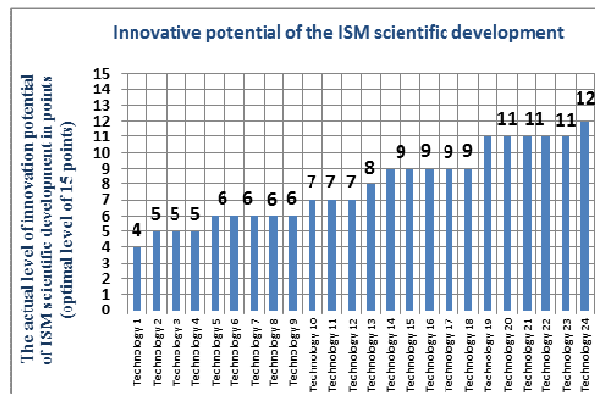


Fig. 6 Innovative potential of the ISM scientific developments

Fig. 4 shows the trend of increasing the number of prepared "Technology Offers" and "PR Research Profiles" by departments and laboratories of ISM NASU for the period 2012 to 2013, which correlates with an increase in the number of active events on the project "START" (Fig. 5) aimed at improving the innovative competence of the IMS NAS employees.

It was found (Fig. 6) that 50% of prepared "Technology Offers" have average or above average level of innovation capacity and the level of the commercialization potential data of «Technology Offers" makes - 45.8% (Fig. 7).

Evaluation of innovation competence focus groups of the ISM researchers showed (Fig. 8) that the level of knowledge in the field of scientific and technological innovations in the course of the project has increased up to an average level at 82.7% of employees.

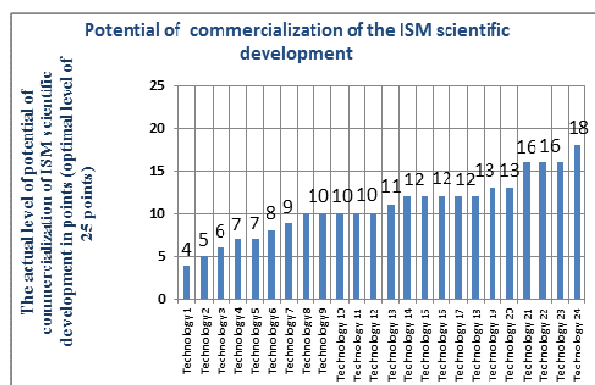


Fig. 7 Potential of commercialization of the ISM scientific developments

However, only 7% of employees have a level of

competence in the area of commercialization approaching to the optimal level and more than 30% of employees have insufficient competence to commercialize their scientific developments.

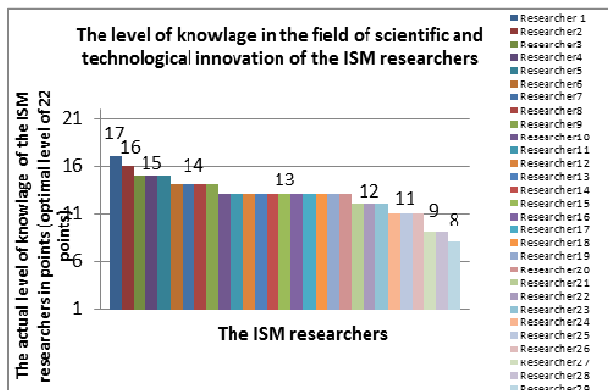


Fig. 8 Level of knowledge in the field of scientific and technological innovation of the ISM researchers

## II. RESULTS

As a result of the formation of "PR Research Profiles" was formed eight new international research consortium that prepared 12 project proposals in the different European programs, of which:

- 5 project proposals are embodied in new operating projects;
- 6 project proposals are preparing for submission to the program "Horizon 2020";
- 1 project proposal is under consideration.

To promote scientific cooperation between research centres in Europe and ISM NASU and formation of the scientific organization of innovation type, under the "START" project it has been proposed to create:

- "Polish- Ukrainian scientific laboratory" aimed at carrying out research works and getting innovative scientific results;
- "Center for Innovation and Technology Transfer" (CITT) of the Institute for Superhard Materials of NASU, aimed at the development of innovation and commercialization of research results into industry. Particular attention will be given to training and consulting of employees, graduate and doctoral students in the field of the ISM commercialization of research results and entrepreneurship in the science and technology field.

The three main direction of activity of CITT:

1. Carrying out marketing and patent market studies, preparation of technicoeconomic studies.
2. Technology transfer and licensing activities.
3. Patenting of intellectual property.

## III. SUMMARY

Analysis of the competitiveness index and group innovation indicators in Ukraine shows that one of the main problems of economic development of Ukraine is the activation of

innovation.

Despite the fact that scientific and technological potential of Ukraine in a number of scientific organizations is reducing, Ukraine has risen to 14th place in 2012 compared to 40 (2011) and 54 place (2010) in terms of innovation efficiency characterizing the creation of special conditions to foster innovation effectiveness.

Participation of Ukrainian scientists in projects financed by international foundations and EU Frame Programs is one of the tools for the integration of Ukraine into the European Union in the field of scientific cooperation. Thus, in 2012 the number of grants received for research from international funds, compared with 2011 increased by 7.4% and amounted to 1855.

Total number of Ukrainian scientists who participated in international projects, including EU framework programs made 5.3 thousand people.

Development of international cooperation ISM NAS of Ukraine with European research centres within the Seventh Framework Program of the European Union project "START" yielded results of positive impact on increasing the level of innovative research and application of scientific results of the ISM NAS of Ukraine.

Thus, the project has revealed a relationship between the increases of actions performed on the project "Start" and increase of the ISM researchers' innovation competencies. Eight new international research consortia were formed, which prepared 12 new project proposals for the different programs of the European Union. Polish- Ukrainian Scientific Laboratory and Centre for Innovation and Technology Transfer (CETT) ISM NASU are being formed.

Participation of Ukrainian scientists in the framework programs of the European Union is one of the tools to implement the scientific potential of Ukraine and accelerate the path of Ukrainian science in the European Research Area through the creation in Ukraine the scientific organizations of innovative type.

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