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Нацыянальная акадэмія навук Беларусі

КАРОТКІ ДАКЛАД

**пра стан і перспектывы развіцця навукі
ў Рэспубліцы Беларусь
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КРАТКИЙ ДОКЛАД

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МІНСК 2012

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ПА НАВУЦЫ І ТЭХНАЛОГІЯХ РЭСПУБЛІКІ БЕЛАРУСЬ

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MAIN RESULTS OF SCIENTIFIC, SCIENTIFIC-TECHNICAL AND INNOVATIVE ACTIVITY IN BELARUS

The Republic of Belarus has come into industrial-innovative phase of the economic development. This stage is characterized by adaptation of the scientific field to modern economic conditions what will lead to radical changes in structural, organizational, staffing, infrastructural and financial assurance of the scientific development, controlled by the corresponding regulatory.

Though ineffective policy of attraction of private sector to development of scientific-technical potential, relatively low activity of Research and Development members has been still a weak segment of the whole scientific-technical system in the country, when development and manufacturing application of technical innovations and science-intensive products are key factors to achieve and maintain competitive advantages at domestic and international markets.

In this connection the Head of the State set the scientific community a task to implement a major reconstruction of the scientific field of the Republic of Belarus in order to satisfy its requirements of real economy and social development of the country.

The Government of the Republic of Belarus and the National Academy of Sciences of Belarus together have considered reforming of the scientific field including its major reconstruction and developed corresponding complex of measures with its following main goals — revival, improvement and development of scientific-technical assurance of sectors, optimization and improvement of academic and institutional sectors of science.

The national science has become mainly applied. In 2011 part of scientific researches and development in the total amount of domestic current outlays (without capital costs) counted 84 %.

2011 is remarkable for to be an important stage of confirmation of milestones of development of the Belarusian science, as follows:

- increasing effectiveness of scientific researches and development;
- expanding sphere of application of results, expanding innovative activity;
- developing advanced technologies including those ensuring cost-effective use, energy preparedness of the country and ecologization of manufacturing.

Due to achieving set milestones and intensive goal-directed activity Belarus is among the countries having more progressive trends of scientific-technical development.

Human recourse potential of scientific and innovative activity

In early 2012, human recourse potential of the scientific field of the Republic of Belarus was characterized by the following performances: the total number of those who was involved in scientific researches and development counted 31.2 thousand people, among them 19.7 thousand people (63.4 %) — researchers; 2.2 thousand people (7.1 %) — engineers; 9.3 thousand people (29.5 %) — auxiliary personnel.

In comparison to 2010, the number of people carrying out scientific researches and development decreased by 518 people (1.6 %), among them researchers — by 211people (1.1 %), engineers — by 12 people (0.5 %), auxiliary personnel — by 295 people (3.1 %). In 2011, the number of researchers in the higher education sector carrying out scientific researches and development increased by: PhDs — by 4 people (0.5 %), Candidates of Sciences — by 16 people (0.5 %).

In 2011, the number of candidates to the academic degree increased by 243 people (5.1 %) generally throughout the country in comparison to 2010. The performance of effectiveness of postgraduate education by percentage of candidates to the academic degree who defended their theses in due time counted 3.3 % of the total number of a class (in 2010 — 3.5 %). On specialties, needed for development of high-quality manufacturing works, referring to V and IV technological mode of economy, 496 candidates to the academic degree trained (among them 27.6 % entered in 2011), what counts 11.4 % of the total number.

In 2011, the number of candidates for a doctor's degree changed unessentially in comparison to 2010 and made up 99 people. In 2011, the performance of effectiveness of PhD program by percentage of candidates for a doctor's degree who defended their theses in due time counted 8.0 % of the total number of a class (in 2010 — 6.0 %).

Financing on scientific researches and development

In 2011, the Republican budget set financial costs on scientific, scientific-technical and innovative activity in the amount of 865,0 milliard rubles. Actual expenses of the Republican budget for scientific, scientific-technical and innovative activity made up 773.8 milliard rubles in 2011 or 0.28 % of GDP.

Over the last years the research intensity of GDP has calculated around 0.7 % that is less than critical level of 1.0 %. The National Security Concept of 2011–2015, the Program of social and economic development of 2011–2015, the State program of innovative development of 2011–2015 forecast achievement of given index counting 1.2–1.4 % in 2011 and 2.5–2.9 % by 2015.

In 2011, the research intensity of GDP calculated on the total amount of internal expenses basis (the method of OECD countries) totaled to 0.76 %. In 2011, in comparison to 2007, this index decreased by 21.0 %. Countries of European Community maintain the research intensity of GDP on the level of 2.0 % and higher. Research intensity of GDP index of the executed research, development and services of scientific-technical character (methods of CIS countries) made up 0.81 % in 2011 (in 2007 — 0.73 %).

As the result of funding gap of the Republican budget of internal expenses for scientific researches and development execution of one of the main indexes of innovative development of the Republic of Belarus is at threat. Thus there is sense to increase volume of financing projects on the flat basis by means of the Belarusian innovation fund as well as to organize venture financing of innovative projects.

It is necessary to attract venture capital financing funds of banks, organizations to the system of venture capital financing. From now to minimize risks promotional tax on profits from executed venture project should be set.

Expenses of the Republican budget on development of material and technical resources totaled to 54.4 milliard rubles in 2011 (growth — 288.7 %).

Main results of execution of state programs of scientific research

In the Republic of Belarus, in 2011, 20 state scientific research programs were executed (in 2006–2010 — 41), including 16 state scientific research programs as of 2011–2015, list of which approved by the Regulation of the Council of Ministers of the Republic of Belarus on 9 June, 2010 No. 886 and 4 programs of the list of state programs of the fundamental and applied scientific researches in natural, technical, human and social sciences approved by the Regulation of the Council of Ministers of the Republic of Belarus on 28 November, 2005 No. 1339. Their terms expire in 2011–2013.

In 2011, according to open research plan 1340 tasks of state programs of scientific research were executed (SPSR) (without regard to scientific and organization accomplishment), among them organizations of the National Academy of Sciences of Belarus — 837 tasks (62.5 %) including out of co-contractor — 509 tasks (38.0 %), organizations of the Ministry of Education — 711 tasks (53.0 %), including out of co-contractor — 371 (27.7 %), organizations of the Ministry of Healthcare — 93, the Ministry of Industry — 30, the Ministry of Agriculture and Food — 29, the State Military Industrial Committee — 22, the Ministry of Emergencies — 15, the Ministry of Natural Resources and Environmental Protection — 10 tasks.

About 200 organizations were involved in SPSR, among them 74 organizations of the National Academy of Sciences of Belarus, 40 — of the Ministry of Education, 20 — of the Ministry of Industry, 17 — of the Ministry of Healthcare, 7 — of the State Military Industrial Committee, 5 — of the Ministry of Emergencies, 5 — of the Ministry of Agriculture and Foodstuffs, 2 — of concern "Belneftekhim", 2 — of the Department of Presidential Affairs and other organizations, subordinated to the President of the Republic of Belarus, and 24 organizations of other departmental affiliation and juridical people without departmental affiliation.

In all the SPSRs Highly qualified scientists and experts took participation— members of the Academy of Sciences and (or) corresponding members of the National Academy of Sciences of Belarus, Doctors of Science (from 15 to 306 on a program) and Candidates of Science (from 39 to 907 on a program). To execute programs there were attracted about 60 candidates for a doctor's degree, over 840 candidates to the academic degree, about 290 candidates for a master's degree and over 620 students. In 2011, executives of programs defended 17 doctoral and 124 Candidate's dissertations.

The executives ensured attraction to execution of works for account of non-budgetary financing programs — owned funds of organization-contractors, other organizations and enterprises, conducting a set of research phases at the expense of economical-contractual works, international projects. And equipment for the researches was purchased due to these funds. In 2011, apart from allocated funds from the Republican budget in accordance with the fixed practice, in order to execute tasks of 20 SPSRs funds from non-budgetary resources were employed to the extent 39.4 % of the total value of implemented works.

Scientific researches on tasks of programs of the year 2011 resulted in stating over 1,200 new science regularities, creating over 1180 new methods and methodologies of research. There were designed and created around 360 layouts and more than 2,830 experimental samples of devices, appliances, systems, complexes, cultivars, materials, drugs and other new technological items, around 300 laboratory techniques. There were published over 10,100 scientific articles and reports (among them higher 31.0 % published abroad), over 1,000 books (including 360 monographs and near 380 textbooks and teaching guides). It was obtained around 640 title of protections for industrial property rights (among them over 460 for inventions), and 620 patenting application. With the use of the results of scientific researches on tasks of programs of SPSRs about 1,330 treaties and near 460 international contracts were performed to create scientific-technological products.

Main results of execution of scientific-technical programs, components of science assurance of state programs

In 2011, there were executed 1,498 tasks in the framework of 28 State Scientific-Technical Programs (SSTP), 9 Departmental Scientific-Technical Programs (DSTP), 6 Republican Scientific-Technical Programs (RSTP), science assurance of 18 State Programs (SP), among them 899 tasks (60.0 %) were implemented on SSTP, 192 tasks (12.8 %) — on DSTP, 30 tasks (2.0 %) — on RSTP, 377 tasks (25.2 %) — on science assurance of SP. 1,496 tasks of all types of scientific-technical programs were executed within planned scale, 2 tasks were not done — according to SSTP and SP. 184 tasks were completed (12.3 % of the executed tasks), among them 102 tasks — on SSTP, 27 tasks — on DSTP, 5 tasks — on RSTP, 50 tasks — on SP.

Financing of mentioned scientific-technical programs in 2011 counted 453,525.2 million rubles, including 297,610.3 million rubles (65.6 %) — funds of the Republican budget of section "Financing of scientific, scientific-technical and innovative activity", 155,914.9 million rubles (34.4 %) — other funds, including funds of innovation institutions and owned funds of enterprises.

In 2011, within all types of scientific-technical programs there were designed and placed on the stage of practical application 72 names of installations, machines, equipments, 59 names of materials, substances, instruments, 144 technical processes, 40 computer-based systems (complexes), 2,697 methodologies, programs, manuals and other scientific items.

In 2011, within scientific-technical programs 173 patents for an invention in total were received and 213 applications for an invention patents were applied. Annually state scientific-technical programs accrue to over 90 % of the total amount of received patents for an invention.

Reasons of failure of a set of tasks of scientific-technical programs in 2011 at the Research and Development:

- extension of terms of test performance; penalty run at the customer's request;
- short of targeted parameters of designed item of emerging technology;
- shaping additional claims by users to emerging technology.

In 2011, it was performed 42 plans of manufacturing (implementation), created according to completed development of SSTP, DSTP and RSTP. The total amount of tasks to be executed counted 1,121, among them works on 967 tasks (86.3 %) are executed in full, works on 108 tasks (9.6 %) are executed partially, works on 46 tasks (4.1 %) were not carried out by different

reasons. According to SSTP 87.5 % tasks were implemented at planned scale, 8.5 % tasks were implemented partially and 4.0 % tasks were not executed. According to DSTP 82.2 % tasks were implemented at planned scale, 14.4 % tasks were implemented partially, 3.4 % tasks were not executed. According to RSTP 72.6 % tasks were implemented at planned scale, 19.6 % tasks were implemented partially and 7.8 % tasks were not executed.

Manufacturing of newly assimilated products in scope of all types of programs in 2011 totaled to 1,498,548.6 thousands USA dollars, enlargement of manufacturing of emerging products of all mentioned programs counted 9.7 % in comparison to 2010.

Reasons of non-fulfillment of a set of tasks of manufacturing plan, created by completed development of SSTP, DSTP, SP and RSTP. In 2011, economical and (or) associated with absence or diminution in the demand for assimilated products.

By reason of absence or diminution in the demand for development or newly assimilated products it more often happens:

- switch in the other method of production after modernization;
- decrease in demand due to high quality or cheaper (often imported) products;
- overstating of forecasted consumption (low-rank marketing);
- neglect of decrease in demand owing to execution of development (due to extension of terms of wear of details, machines, facilities, etc.);
- absence of scheduled purchasing by ministries (for a example, by the Ministry of Health Care).

To economic reasons are referred:

- absence of funds at contractors' of tasks disposal, mainly for buying raw materials;
- appreciation of raw materials, constitutive elements, including imported ones and energy;
- absence of able to pay demand of consumers.

Brief results of execution of State program of innovation development for 2011–2015

In 2011, 209 most important projects and 205 project development plans were completed; assimilation and manufacturing of new products on 64 tasks of state scientific-technical programs were performed.

Customers of program organization put in operation (assimilated in manufacturing) objects and created production works:

- on 24 most important projects, including: the National Academy of Sciences of Belarus and Brest Region Executive Committee — on 4 projects, concern "Belneftekhim" — on 3, Minsk City Executive Committee — on 2, the Ministry of Construction, the Ministry of Energy, the Ministry of Forestry, the Ministry of Communications and Informatization, the Ministry of Transport and Communications, the State Military Industrial Committee, concern "Bellesbumprom", Vitebsk, Grodno, Mogilev Region Executive Committees, State Administration "Administration of Hi-Tech Park" — on 1 project correspondingly;
- on 28 project development plans, including: the Ministry of Forestry — 6 projects, the Ministry of Agriculture and Foodstuffs — 5, the Ministry of Industry and concern "Bellegprom" — on 3, concern "Belgospischeprom" and Gomel Region Executive Committee — on 2, the Ministry of Construction, the Ministry of the Housing, the Ministry of Transport and Communications, Vitebsk, Minsk, Mogilev Region Executive Committees Minsk Region Executive Committee — on 1 project correspondingly.

There were introduced for planned capacity of manufacturing on 8 innovative projects, including the National Academy of Sciences of Belarus on one most important project.

There were implemented assimilation and manufacturing of new products on 57 tasks of SSTP in the amount of 72.2 million USA dollars.

The total capital outlay, associated with execution of innovative projects of State program in 2011, made up 15,832.8 milliard rubles (157.3 % of the plan), among them on most important ones — 13,287.7 milliard rubles (157.9 %). Capital outlay from financing sources of all the innovative projects allocated as follows: owned funds — 4,759.6 milliard rubles (30.0 %), foreign investment credits — 4,672.2 milliard rubles (29.5 %), credits of Belarusian banks — 5,256.0 milliard rubles (33.2 %), funds of the Republican budget — 1,022.6 milliard rubles (6.5 %), funds of local budget — 122.5 milliard rubles (0.8 %), including on most important projects: owned funds — 4,088.0 milliard rubles (30.7 %), foreign investment credits — 4,427.7 milliard rubles (33.4 %), credits of Belarusian banks — 3,805.0 milliard rubles (28.6 %), funds of the Republican budget — 856.8 milliard rubles (6.5 %), funds of local budget — 110.3 milliard rubles (0.8 %).

Volume of manufacturing of innovative products — 1,258.6 milliard rubles, created and (or) modernized — 2,543 working places.

Patenting and usage of subjects of the intellectual property

As of January 1, 2012, on the territory of the Republic of Belarus was in force:

- 100,436 trademark certificates, 84,639 (about 85.0 %) of which belonged to foreign persons;
- 10,862 patents for inventions, 6,507 (about 60.0 %) of which belong to foreign patent holders;
- 2,516 patents for utility models, 169 (6.0 %) of which are the property of foreign patent holders;
- 1,223 patents for design inventions, 574 (47.0 %) of which belong to foreign patent holders;
- 233 patents for kinds of plants, 63 (27.0 %) of which are the property of foreign patent holders;

There is a positive dynamics in inflow of the applications for the issue of the title of protection for the subjects of industrial property to the National Center of intellectual property in 2011.

There were filed to National Center of intellectual property in 2011:

- 1,871 applications for patent issue for inventions (the number of applications filed from national applicants was 1,725, or 92.2 % of the total number of applications filed in 2011);
- 1,090 applications for patent issue for utility models, 1,022 (93.8 %) of which were from national applicants;
- 311 applications for patent issue for design inventions (54.3 % of them in total were from national applicants).

The total number of applications filed in 2011 for registration of trademarks and service marks was 11,060. The number of applications from national applicants was 3,649, or 33.0 % of the total number of applications filed according to the national procedure.

The total number of contracts registered in the National Center of intellectual property over the five recent years 75 % increased. The subject of this contracts was industrial property (in 2007 — 415, 2011 — 738). The number of licensed contracts in total number of registered contracts was 65.7 %.

The growth of the total amount of effective Eurasian patents from 2007 to 2011 was 74 % (in 2007 — 182, 2011 — 317). There was a threefold increase in the total quantity of applications filed according to the international procedure for protection of trademarks abroad (in 2007 — 67, 2011 — 208).

There should be noted significant work for enlargement of the export of domestic goods and services on the basement of protection of trademarks abroad.

The number of applications for protection of trademarks filed according to the international procedure for 1 million of inhabitants in 2007 was 2.4 for Belarus, 4.3 applications for Russia, 2.9 applications for Ukraine. The figures for above mentioned countries in 2011 were 22, 10.8 and 8.1 applications respectively.

Thus, there has been a ninefold increase in the figures for Belarus over the recent five years.

As on December 31, 2011, the total amount of registered subjects of industrial property was 150,000.

International collaboration in research and technology and technology intensive export

The total sum of the currency resources transferred to the both scientific and scientific-production organizations of Belarus under the contracts concluded with foreign partners was equal to 57.91 million USA dollars. This sum is 24.45 million USA dollars (or 42.0 %) greater than the one in 2010. The top ten of foreign countries judging on the sum of currency resources transferred to the organizations-partners by Belarusian organizations were Russia, Saudi Arabia, England, China, India, Venezuela, Ukraine, USA, Germany and France.

The measures taken in 2011 gave the possibility to achieve a planned level of export of the science intensive and high-technology production— 3,205.3 million USA dollars while the plan was 3.100 million USA dollars (defined by Stepwise strategy until 2015 of increase by at least 200 per cent of the share of the science intensive and technology intensive production in total volume of Belarusian export asserted by the First deputy of Prime Minister of the Republic of Belarus on December 27, 2009, No. 34/310-491), that equals to 6.9 % from the total export volume of goods and services in 2011).

In general there is a positive dynamics of the growth of volume of the technology intensive production export within the whole period of supervision by State committee on science and technology of the Republic of Belarus of this progress from 2008 to 2011 and defining the share of the export of this production in the total volume of Belarusian export: in 2008 — 1,430.8 million USA dollars (3.9 %); 2009 — 2,257.4 million USA dollars (9.1 %); 2010 — 2,213.0 million USA dollars (7.4 %), 2011 — 3,205.3 million USA dollars (6.9 %).

There is a negative balance in royalty and license fee in 2009 — 80.1 million USA dollars, 2010 — 104.8 million USA dollars, 2011 — 82.1 million USA dollars.

Priorities, basic tasks in the scientific innovative sphere of the Republic of Belarus for 2012 and near future

Current system drawbacks and problems in scientific sphere of the Republic of Belarus

An important problem to be resolved immediately in certain branches of real sector of economy is an absence of main research institutes, designing departments, full-fledged institute of general designers.

Besides, there is no proper coordination of activities in scientific and technical sphere when it concerns creation of technologies and technics.

Susceptibility of results in scientific developments by the branches of real sector of economy is insufficient in the country.

Conceptual offers to increase the level of effectiveness of scientific and scientific and technical activity

To orientate the reformation of scientific and technical sphere in high-priority order for creation of large designing departments headed by chief designers, which will guarantee task assignment for scientist, Institutions of Higher Education (in the sphere of the personnel training), industrial workers and for sectoral research institutes.

To intensify the role of the ministers in the development of the scientific and technical sphere and to give them a right to dispose funds including budgetary ones in order to finance scientific and technical activity and improve it, to create programs of scientific and technical developments according to the certain problems of the sector, to create sectoral scientific and technical institutes and designing departments,

To solve mid-term and long-term tasks of the scientific and technical activity by means of implementation:

- of fundamental and applied researches conducted by scientific schools, headed by scientists with the world known names;
- of design and experimental and technological and experimental researches conducted by sectoral designing departments headed by chief constructors;
- of scientific and technical developments with their experimental implementation in research and practice and scientific and production centers.

For implementation of above mentioned tasks all the necessary conditions have been created in our country. There is highly qualified scientific personnel who are the most important strategic resource and national pride in the Republic of Belarus.

The formation of a new segment in national economy which will be represented by high technological and science intensive concerns corresponding to the V and VI technological modes.

To make this it is essential to:

- implement activities of the Concept of national security of the Republic of Belarus in order to achieve good results in scientific and technical safety;
- implement State program of innovative development of the Republic of Belarus in 2011–2015;
- implement the Strategy of the Republic of Belarus in the sphere of the intellectual property in 2012–2020;
- create registers of technology intensive and innovative production;
- provide all the necessary conditions for modernization of the national economy in accordance with main directions of the scientific and technological activity and State program of innovative development of the Republic of Belarus in 2011–2015 including:
  - an increase of the specific weight of innovative production in total volume dispatched production; up to 14–15 %;
  - an increase of the share of the innovatively active organizations in total amount of organizations up to 25 %;
  - the growth of the export share of the science intensive and high technological production in total volume of Belarusian export up to 10 %;
  - improvement of the management system and enhancement of the effectiveness in domestic innovation system;
  - intensified development of the sectoral science (creation of the sectoral, territorial and integrated organizations — holding companies, clusters, etc.);
  - intensification of the implementation of the projects on creation of regional, scientific and technological parks;
  - optimization of some basic directions in scientific and in scientific and technological activities;

- continuation of the work on creation of the mechanisms of venture financing;
- payment as applicable to the innovative fund of EurAsES;
- development of the state system of the scientific and technological information;
- development of the legislation in the share of the intellectual property taking into consideration international standards;
- creation of the republican, sectoral and regional organizations and subdivisions on commercialization of the intellectual property;
- creation of new designer-tecnological, planning organizations and preproduction of sectoral and industrial science, engineering and technical centers, structural subdivisions of institutions of higher education (including chairs and their branches) in the enterprises, sectoral laboratories within the institutions of higher education and academic institutions;
- orientation of the budget and tax policy as well as money and credit and the investment policy for creation of the favorable conditions for creation and functioning of the system of the state and private partnership when financing the scientific and scientific and technological activities;
- creation of the multiple-vector system of financing of the scientific and scientific and technological, innovative activities using new mechanisms of financing (fund, credit, insurance and venture).

The key goal of development of the innovative economy is creation of proper conditions for building the competence of the innovative activity at citizens: the competence of the "innovative person" as a subject of all innovative conversions.

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