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CONTENTS

FOREIGN POLICY

SOCIETY

THE SWING PRINCIPLE IN SCIENCE AND INNOVATIONS: BETWEEN RADICAL MODERNISATION AND MAINTAINING THE *STATUS QUO*

Andrei Laurukhin

Summary

In spite of the "Lukashenko ultimatum"[1] given to Belarusian science at the end of 2011, the status quo was still maintained and promised reforms were stalled. Attempts to initiate "internal competition" between academic and university science ran into obstacles due to the inertia of the former and inactivity of the latter.

The announced transformation of the funding structure and the increased actual costs for financing scientific, technical, and innovation activity did not change the long-standing trend of science being chronically underfunded. The key problem of linking science with business and industry was still not resolved. Apart from some minor improvements to the situation regarding postgraduates in several disciplines, the general trend of downsizing and ageing of scientific staff continued.

Positive results during the year included: improved research intensity figures (up from 0.7% in 2011 to 1% in 2012); Belarus' rising international ratings (from 52nd to 45th place, according to the Knowledge Index; from 73rd to 59th place, according to the Knowledge Economic Index; and 6th place worldwide for the number of patent applications filed); and various successes in the information technology field.

Trends:

- Drafting of non-standard laws and legislation on science and innovation which do not conform to international requirements;
- Reduced state expenditure on research and development in the GDP, as well as reduced internal spending on research and development in the higher education sector;
- Spending on technological innovation is shifting from the state budget to enterprises' own funds, credits and loans;
- Stalling of structural reforms to the scientific sector, and slowed innovation development.

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[1] http://www.belta.by/ru/all_news/president/Lukashenko-predlagaet-peres-motret-strukturu-organizatsii-nauki-v-Belarusi_i_582374.html

- Deformation of the qualification and age structure, increasing the risk of unbalancing the entire mechanism for renewing staff in Belarusian science;
- Marginalisation of social and humanitarian sciences.

Drafting of laws and legislation on science and innovation: one step forward, two steps back

According to data from the State Science and Technology Committee (SSTC), *four* new laws, *four* presidential decrees, *six* Council of Ministers resolutions, and *eleven* SSTC resolutions were passed in 2012. Among these, we should mention: Belarusian presidential decree No.357 of August 7, 2012 *On the acquisition and use of funds for innovation*; law No.425-3 of July 10, 2012 *On state innovation policy and innovation activity in the Republic of Belarus*; Belarusian Council of Ministers resolution No.205 of March 2, 2012, which approved an intellectual property strategy for 2012—2020; and a plan for immediate action to implement an intellectual property strategy in 2012—2013.

Apart from legislation aimed to develop innovation infrastructure, the regulations designed to stimulate scientific, technical, and innovation activity[2] were also fairly positive. At the same time, a number of key problems remain unresolved. First and foremost, the law *On state innovation policy and innovation activity in the Republic of Belarus* (which came into force on January 27, 2012) filled in some gaps in the definitions of "innovation" and "innovation activity," but did not provide

2 Starting from January 1, 2012, the Belarusian Tax Code specified new tax benefits for innovation organisations: income tax benefits, a reduced tax rate of 10% on profit made by organisations from selling their own high-technology products, etc. Also designed to stimulate scientific, technical, and innovation activity were: Belarusian Council of Ministers resolution No.1691 of December 15, 2011 *On amendments to Belarusian Council of Ministers resolution No.98 of January 26, 2010* (concerning an increased prize pool for winners of the national innovation projects competition); Belarusian presidential decree No.231 of June 6, 2011 *On several issues for stimulating the development of high-efficiency industries*; the Belarusian Ministry of Labour and Social Protection and Belarusian State Science and Technology Committee's resolution No.108/22 of November 4, 2011 *On the pay scale for scientific staff of the Belarusian National Technical University's scientific research department*; etc.

any precise definitions according to the international criteria set out in the OECD's Frascati Manual. These imprecise definitions of key concepts, which do not conform to international standards, mean they can be interpreted and applied arbitrarily, making it difficult to monitor them adequately or analyse them statistically, and thus hindering Belarus' integration into the international innovation market.

The laws and amendments passed in 2012 did not alter the mechanism specified in decree No.432,[3] which defined the possession and subsequent use of property rights for products of scientific and technical activity. This mechanism gives priority to the state (in questions of acquiring rights) and state organisations (in questions of using those rights). The mechanism also hampers initiative, complicates ways of introducing innovation into industry, and prevents patents from being kept in force on the international innovation market.

The regulations were also unable to reflect the changing nature of scientific and technical activity following integration into the Eurasian Economic Community. Finally, a set of regulations[4] was intended to bring legislation on science and innovation into line with the Belarusian Education Code, but the latter's extremely conservative standards could have negative effects on the development of university science, as well as scientific, technical, and innovation activity in general.

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3 Belarusian presidential decree No.432 of August 31, 2009 *On several issues of acquiring property rights for products of scientific and technical activity, and using those rights*.

4 The following legislation came into force in 2012: Belarusian presidential decree No.6 of June 27, 2011 *On amending Belarusian presidential decrees No.7 of March 5, 2002 and No.18 of November 24, 2006, and repealing Belarusian presidential decree No.15 of July 17, 2008*; Belarusian presidential decree No.362 of August 11, 2011 *On amending and supplementing Belarusian presidential decree No.367 of August 11, 2005*; and Belarusian Council of Ministers resolution No.1049 of August 4, 2011 *On amending, supplementing, and repealing several Belarusian government resolutions on education issues*, which had approved regulations on planning, funding, and managing the training of highly-qualified scientific staff using state budgetary funds (and concerned the repealing of Belarusian Council of Ministers resolution No.432 of April 28, 2005, and amending of Belarusian Council of Ministers resolutions No.1283 of September 30, 2006 and No.1411 of October 29, 2007).

Funding for science and innovation: shifting from the state budget to credits and loans

According to SSTC data,[5] actual state budgetary spending on scientific, technical, and innovation activity was BYR 1,316.1 bn in January-December 2012, which was BYR 379,732 million more than in 2011[6], but 5.3% lower than what was projected for 2012. The proportion of budgetary funds spent on scientific, technical, and innovation activity was 0.26% of GDP, which was 0.01% less than in 2011. Belarus is still in the shameful position of being one of the OECD and CIS member-countries with the lowest state spending on research and development in the GDP (next to Malta and Macedonia).[7]

There was a continued trend of reducing the Belarusian higher education sector's share of internal spending on research and development, which in 2011 was 9.6% of the total funds for internal spending on research and development (as opposed to 17% in 2005). Funding for scientific research activity in the higher education sector still did not reach the 2008 level (0.1%),[8] and corresponded to the lowest level of similar spending in OECD countries (0.06% of GDP, according to data from 2011).[9]

As before, the lion's share of the funding structure for science and innovation in higher educational establishments came from national budgetary funds, and the amount of education establishments' expenses covered by innovation funds fluctuated within the hundredths of one percent (in 2010, it was 0.04% of the total expenditure).[10] One positive aspect was an increase in spending on materials and equipment for science, which exceeded 10% of state budgetary spending on science for the first time in recent years, reaching 11.4% in 2012.

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5 http://www.gknt.org.by/opencms/opencms/ru/news/———2012———2013-/

6 *Science and innovation activity in the Republic of Belarus.* Statistical handbook. Minsk, 2012. P. 68.

7 Ibid., p. 149–151.

8 *Science, innovation, and technology in the Republic of Belarus, 2009*. Statistical handbook. Minsk: BelISA, 2010. P. 9.

9 Calculations based on: *Science and innovation activity*, op. cit., p. 66–70.

10 *Innovation performance review of Belarus*. UN, New York and Geneva, 2011. P. 121–122.

In 2012, the spending structure for technological innovation (regarding funding sources) was approximately the same, as was the trend for changing sources of funds. According to official data for 2011, out of the total expenditure on technological innovation (regarding funding sources): 60.5% was industrial organisations' own funds, and 48.5% was service organisations' own funds; credits and loans covered 30.3% and 10.8% respectively; national budgetary funds accounted for 3% and 3% (of which funds for innovation were 1.3% and 1.8%); and local budgetary funds constituted 0.1% and 0.1% (of which funds for innovation were 0.03% and 0.0% respectively).[11] Overall, the funding structure for technological innovation showed a continued trend for increased shares of enterprises' own funds, and a reduced proportion of national budgetary funds (down from 8.7% in 2007 to 3% in 2011), as well as a considerable increase in the amount of credits and loans (up from 9.4% in 2007 to 30.3%(!) in 2011).

Therefore, over 90% of all spending on technological innovation in industrial organisations, and 80% in service organisations, originated from two sources: own funds, and credits and loans. Both sources are indirectly derived from the state budget and basically rule out any risky projects, which is a serious obstacle for innovation development.

In the short term, it is difficult to predict any significant changes for the better in the funding structure due to the low level of non-state funds for research and development (0.53% of GDP in 2011), and the insignificant involvement of small and medium-sized enterprises (SME): only 0.68%[12] of the total number of organisations surveyed were involved in joint innovation projects. The amount of venture capital in the GDP did not even figure in the statistical data.[13]

The Academy of Sciences: merely an ideologist of modernisation

2012 had been declared a year of structural reforms, yet demonstrated one of the weakest aspects of the centralised, state-

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11 *Science and innovation activity*, op. cit., p. 104–105.

12 Ibid., p. 15–16.

13 Ibid., p. 149.

centric model for science and technology — its inability to be reformed from the inside. Attempts to initiate "internal competition" between the Academy of Sciences and science in universities came up against an insurmountable obstacle: academic and university science are in totally different "weight classes" concerning certain key parameters.

Despite the fact that universities are the main "hotbed of professionals" in the Belarusian scientific and innovation system, science in higher education occupies a marginal position. Higher educational establishments accounted for just 12.6% of the total number of organisations involved in scientific research and development (according to data from 2011). Their human resources constituted 9.8% of the total number of staff engaged in scientific research and development (2011 data), and they carried out 12.06% of all scientific work in 2010. The proportion of innovation enterprises belonging to higher educational establishments was 6.4% of the total (2011 data); their proportion of valid patents for inventions was 18% of the total (2009 data); and funding for research activity in higher educational establishments was 0.06% of GDP (2012 data).[14]

On the contrary, the Belarusian National Academy of Sciences (NAS) is the absolute leader in terms of the quality of its scientific staff and its contributions to research and development. According to 2011 data, its staff made up 31.3% of all people engaged in scientific research and development (including 31.6% of researchers, 66.4% of Doctors and 58.7% of Candidates of Science), and they implemented 63.9% of the total number of projects funded.[15] On the one hand, such a high concentration of human resources fits in perfectly with the current centralised, pyramid-managed model for science and innovation management. On the other hand, however, it complicates corporate competition, without which effective, substantial restructuring is impossible.

Such restructuring is obviously needed due to the rather modest contribution the NAS makes to the national economy.

14 *Science and innovation activity*, op. cit., p. 28.

15 The General Assembly of the Belarusian National Academy of Sciences sums up its results (2012, June 21) // *Viedy*, No.26 (2390).

This is striking if one compares it with newer entities like the High-Tech Park (HTP). According to the NAS' 2011 report, the work done by 17 800 researchers, technicians, auxiliary and service staff brought in just over USD 70 million,[16] whereas the total income from sales of software products and software development services created by 14 500 IT specialists was USD 370.5 million.[17]

An equally impressive difference in development dynamics is that in just *six* years, the HTP has managed to: make USD 1 bn; attract companies from 53 countries (of which around 50% were joint-stock and foreign enterprises); direct 84% of exports to high-tech markets in America and the European Union; increase direct foreign investments by 30% (even though they had generally dropped by 1.5 times); create 14 500 new jobs; and make some perfectly realistic plans for the future.[18] The number of NAS staff, on the other hand, is declining annually, and their scientific development rates leave a lot to be desired.

The Academy of Science's contribution to developing the scientific-industrial complex is also underwhelming: out of 501 organisations engaged in scientific research and development, the majority of economically viable research and development projects are implemented by scientific research institutes and design offices which employ 16 800 researchers (53.8% of the total!). Moreover, the core of the scientific-industrial complex is 67 organisations belonging to the ministry of industry (over 4300 researchers) and 18 organisations belonging to the state military-industrial committee (more than 2,000 researchers).

Consequently, despite being in the lead in terms of the quality of its scientific staff and contributions to research and development, the NAS is still the epitome of fundamental, theoretical science which bears little relation to the demands of the economy and, therefore, innovation development. Nevertheless, the NAS,

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16 Ibid.

17 http://www.park.by/post-594/

18 According to estimates by International Finance Corporation experts, the income from the Belarusian IT sector could reach USD 3—4 bn by 2020, or 4—5% of the last year's GDP. Sources: *The High-Tech Park sums up its work in 2012.* Ibid.; *Can the Belarusian IT sector become the driving force behind the economy?* Retrieved from http://news.tut.by/it/336052.html.

like the SSTC, is a key element of Belarus' centralised, hierarchical, and pyramid-managed national innovation system. This contradiction between the status of the NAS and its actual contributions to the research intensity of the economy allows one to take Prime Minister Mikhail Myasnikovich's statement[19] regarding its role in the modernisation process literally: at best, the Academy of Sciences could be the main ideologist of modernisation, but not its initiator and driving force.

Conclusion

Hopes of creating modern laws and legislation on science and innovation that would conform to international standards and requirements have not been justified. The legislature's attempts to combine the principles of a "manually managed" state-centric economy with contemporary innovation trends have led to hybrid standards which hinder the growth of the economy's research intensity, forcing innovators out into the fringes of innovation development.

Attempts to compensate for the chronic lack of funds for science and innovation with more credits and loans rules out risky projects, and preserves an inefficient funding model which is incompatible with a research-intensive economy. Budget cuts for science and innovation, a badly thought-out infrastructure policy, and increased disciplinary control are turning the state into an overseer that makes mindless, ineffective use of the current system's financial, intellectual, and institutional resources. At the same time, the successes of new enterprises and organisations which do not fit in with the current organisational structure (*e.g.* the HTP) are becoming all the more obvious. This puts the issue of the latent erosion of Belarus' centralised, pyramid-managed national innovation system firmly on the agenda.

[19] http://www.government.by/ru/content/4232

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