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A survey and analysis of developments in the Republic of Belarus in 2014

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SCIENCE AND INNOVATION 'UNDER MARTIAL LAW'

Andrei Laurukhin

Summary

In 2014, the government's attempts to reform the science sector came to naught. The funding of science from the national budget and extra-budgetary resources decreased considerably. Technological innovation costs passed from the national budget on to enterprises, which are supposed to use their own funds and loans to cover the expenditure.

The cut in funding of science has inevitably resulted in a degradation of the key performance indicators of the innovation-driven growth, as well as the continuous brain-drain. The number of 'innovation-active' industrial enterprises goes down, while the proportion of 'innovation-lazy' enterprises is increasing, which particularly concerns the oil industry. Against the background of the economic slowdown, the government places its stake on a mobilization model of industrial development, which is also close to resource exhaustion.

Trends:

- The proportion and amount of the central funding of science is reducing;
- Highly skilled professionals tend to seek better employment options given the risk of imbalances in reproduction of the workforce capacity in Belarusian science;
- The key indicators of innovative development reflect a progressive deterioration of the situation:
- A structural reform of the science sector has failed, while the mobilization model is used at full blast to develop the innovation system;
- Social sciences and humanities undergo ideologization and political instrumentalization.

Overview

In 2014, while Ukraine was in the middle of rampant warfare, Belarusian science was in the calmest and most tranquil period over the past five years. The years-long attempts of the government to modernize science using command-and-control methods have apparently came to naught. During the traditional New Year 'talk between the president and scientists', we did

not hear any ultimatums (as in 2011¹) or passionate calls for modernization of science (as in 2013²). Lukashenko unusually humbly asked for improvements rather than a reform³, and not of the entire system, but at least one of its components – the Higher Attestation Commission (HAC). So, the years of 'reforming' reduced to a trivial 'optimization', i.e. a staff reduction and a cut in public funding (the year 2014 saw a peak of staff losses).

Regretfully, positive trends associated with higher science intensive GDP index in 2013, were not observed in 2014. Belarus' science intensive GDP index remained below the internationally accepted threshold and even below the level set by the *Program of Socioeconomic Development of the Republic of Belarus for 2011–2015* and the *State Program of Innovative Development for 2011–2015*.

There were some improvements in 2014, though, such as certain revitalization of international cooperation when Belarusian teams took part in the Seventh Framework Programme for Research and Technological Development of the European Union (*Horizon 2020*); a positive trend towards the presence of Belarusian scientists' research findings in international databases (an increase in the number of references in the *Web of Science* and *Scopus*); the retaining of a quite high position of Belarus in international rankings in 2012–2013 (the Knowledge Index; Knowledge Economy Index, the number of applications for inventions); the rapid development of the High-Technology Park (148% growth against 2013 and a 30% increase in exports).

Among the top 10 scientific achievements of the National Academy of Sciences *in the field of basic and applied research* in 2014 were the creation of new magnetoplasmon crystals; a new mechanism for the creation of solid-state diamond-based

¹ "Лукашенко предлагает пересмотреть структуру организации науки в Беларуси." *БелТА*. 24 Nov. 2011. Web. 2 Mar. 2015. http://www.belta.by/ru/all_news/president/Lukashenko-predlagaet-peresmotret-strekturu-organizatsii-nauki-v-Belarusi i 582374.html>.

² "Как Лукашенко собирается модернизировать белорусскую науку?" *Бизнес-лидер*. 25 Jan. 2013. Web. 2 Mar. 2015 http://www.profi-forex.by/news/entry5000017156.html>.

³ "Лукашенко потребовал качества и честности в подготовке." *TUT.BY*. 9 Dec. 2014. Web. 2 Mar. 2015. http://news.tut.by/society/427256.html.

quantum computers; a new method of phase-time recognition of subsurface objects in pulsed radar; discovery of a new marker of thyroid tumors; deciphering of the three-dimensional structure of the membrane bound hemoprotein; detection of polymorphic variants of human genes that can be used as effective markers to assess the susceptibility to osteoporotic changes; discovery of the causes of respiratory failure in patients with a diagnosed obstructive sleep apnea; creation of a multi-parameter stochastic model for estimating the secondary redistribution of radionuclides in natural ecosystems resulted from forest fires; assessment of ultra-structural signs of early myocardial cell injury; assessment of the efficiency of complexes including polyamidoamine and phosphorus ribonucleic acid related dendrimers for the genetic therapy of malignant tumors.

Funding: Switching to 'field ration'

Gross domestic expenditure for research and development (% of GDP) went up a bit (by 0.3% against 2013) primarily owing to a small increase in budgetary (4.0%) and non-budgetary funding (0.4%). At the same time, their proportion still remains at 0.69% of GDP, which is 0.3% less than in the good year of 2007 and much less than in developed countries (0.92% in Lithuania, 0.77% in Poland, 2.75% in Austria, 2.84% in Germany, and 3.78% in Finland), and in the neighboring countries involved in costly armed hostilities (1.21% in Russia and 0.73% in Ukraine).

The composition of domestic expenditure for research and development (by the funding source) has been changing as before: budgetary funds are decreasing (by 9.5% over the past eight years) together with non-budgetary funds (down 4.4%) and funds provided by other organizations (down 3.2%), while the proportion of own funds is going up (by 9.4%) together with funds provided by foreign investors (by 1.6%) and other resources (by 7.1%). A small spending reduction/increase surplus (1.0%) apparently cannot compensate for the devaluation of the national currency and the erosion of own funds, as the trend towards a decrease in absolute terms is still observed. The greatest funding gap in domestic current expenditure for research and development is reported in the sector of fundamental scientific

research. The proportion of this spending is slowly yet steadily reducing (by 2.3% against 2010).⁴

It is particularly remarkable that the warring sides — Russia and Ukraine — have been and will increase public funding of the scientific and innovation sector, while neutral and peaceful Belarus apparently switches to scarce field ration 'under martial law.'

Staff losses: At any cost?

The president once said that the scientists' profession "was the hardest one." This seems to be true given that the number of personnel engaged in research and development almost reached its all-time minimum over the past two years: 28,000 persons. There were fewer of them only in the late 1990s. The number of researchers went down the most (more than 1,000 persons, or over 5% against 2012). This means that the most productive professionals, who are always welcome in the neighboring countries, leave science careers in Belarus. Most of those who choose to leave are specialists without scientific degrees and masters of sciences.

It is worthy of note that not only men but also women, who usually tolerate low salaries and the lack of opportunities for self-fulfillment better than men, have been leaving Belarusian science as well since 2011. It is no less significant that staff losses are reported in all regions of science. The highest rates of staff losses are reported in the field of engineering and natural sciences. The lowest rate is reported in the humanities. Staff losses are occurring in almost all age groups (40 to 49 years the most) except for those at the age of 60 to 69, who slightly grew in number. Geographically, the decrease in the personnel capacity was mainly due to the Minsk region (a two-thirds loss).

The situation goes worse as the number of post-graduate students, which peaked in 2011, went down as well. At the moment, the decrease in the personnel capacity is not compensated even by potential researchers, i.e. the resource base of masters

⁴ Наука и инновационная деятельность в Республике Беларусь. Статистический сборник. Минск: Белстат, 2014. 43. Print.

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of sciences is at risk. At the same time, the composition of personnel engaged in research and development changed insignificantly in terms of proportion: researchers constitute nearly two-thirds; technicians make up less than 8% and support staff accounts for less than one-third.⁵

Innovations under existing conditions: The dominance of 'lazy innovative enterprises' in the oil industry

The negative trends in the innovation sector outlined in 2012—2013 were not reversed last year. The index of inventive activity (the number of patent applications for inventions filed in Belarus per 10,000 of the population) continues to decline. A decline is seen in the number of patents registered by Belarusian nationals and foreign applicants.

The same concerns innovation-active industrial organizations (down more than 7% against 2011). The proportion of such organizations shrank by over 2% against 2012, mostly, as before, due to the key organizations essential for innovative development, specifically those conducting research and development of new products, services and production methods (transfer), new production processes, industrial processes, and production designing.

A reduction in the number of innovation leaders is accompanied by an increase in the number of 'innovation-lazy enterprises', which choose to import foreign innovative machines, technologies, equipment and software. The dominance of such enterprises in the industry leads to a dropout of non-demanded research and human resources from the innovation cycle.

Innovation-active companies are distributed unevenly in terms of geography: they are mainly located in the Vitebsk, Grodno and Minsk regions. The large majority of spending for

⁵ Ibid. 14–33. Print.

Беларусь: наука, технологии, инновации. Минск: ГУ "БелИСА", 2014. 24. Print.; Наука и инновационная деятельность в Республике Беларусь. Статистический сборник. Минск: Белстат, 2014. 10. Print.

⁷ Наука и инновационная деятельность в Республике Беларусь. Статистический сборник. Минск: Белстат, 2014. 56–58. Print.

innovative technologies accounts for enterprises of the processing industry engaged in the production of oil products, other non-metallic mineral products, manufacture of vehicles and transportation equipment, and machinery and equipment. It is noteworthy that the highest spending for organizational innovations falls at very different manufacturing industries: the chemical industry, production of electrical and optical equipment, electronics and foods.

Most of the innovation costs are covered from own funds, which, in conditions of their erosion (due to the economic recession in the region) has a negative impact on successive investment in innovation. Moreover, the funding of technological innovation costs in the industry has been decreasing year after year. There is a degeneration of the institution of innovation funds (on both national and local levels). A relatively small increase in the funding of technological innovation costs is only observed in the service industry. Service providers thus almost have not used local budgets over the past few years.

There is a relatively small decrease in the number of innovation-active companies in the service industry, which is not as bad as it could be. At the same time, increasing is the number of companies engaged in market research related to technological innovation in the service industry, industrial design, other types of pre-production, provision of new services or production methods (transfer), and training of personnel in the field of technological innovation in the service industry.

However, the overall negative trend in the innovation sector manifested itself in a declining proportion of innovative products in the total volume of shipped industrial products, which had been going on throughout 2013 and in the first quarter of 2014. The decline largely affected innovative products exported outside the CIS.

'Prison research laboratory' v2.0?

The concept 'Belarus-2020: Science and Economics' was adopted on March 20, 2014 at a session of the Presidium of the National Academy of Sciences (Minutes No. 3). The concept repeats priorities of the scientific and innovation policy for the

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short-term already pointed out in other documents: development of the unified state system of scientific and technical expertise promoted by the State Committee for Science and Technology; introduction of new methods to finance scientific research (credit, venture, trust, etc.) based on the analysis of their effectiveness with the application of international practices; greater commercialization of completed research and development, including those funded from the national budget; large-scale introduction of automated intelligent systems supporting the research process and its management.⁸ Given the crisis in the economy and a further reduction in resources allocated to science and innovation, the government relies on the stepped up mobilization model of development.

The political and ideological instrumentalization of sociopolitical sciences and humanities is indicative in this respect. The document prescribes "to focus social scientists' efforts to generalize the experience of sovereign Belarus towards selection, systematization and application of the accumulated historical data in the ideological sector to consolidate society, … and popularize the historical heritage as a foundation for patriotic education."

However, the problem is that the existing mobilization model is already very close to the point of resource exhaustion. *Three* short-term scenarios are possible in this situation: (a) a slow, chronic stagnation; (b) a significant rise in the 'pain threshold' of the mobilization model, which is a highway to the Soviet 'sharashka' (the popular nickname of research laboratories formed of imprisoned scientists and technicians in the time of the Stalinist repression), or (c) innovative structural reforms. Considering the *path dependence* of the past 10 to 15 years, most likely, it will be a combination of (a) and (b) scenarios.

Conclusion

Since the modernization reforms in the science and innovation sector have failed against the background of the economic crisis

⁸ О состоянии и перспективах развития науки в Республике Беларусь по итогам 2013 года. Аналитический доклад. Минск: ГУ "БелИСА". 2014. 212. Print.

in the region, the government launches a stricter mobilization model of development. In fact, this scenario revives the Soviet 'sharashka', which blocks the development of knowledge-based innovation economy.

Tightened funding of science and innovation, unarticulated infrastructural policy and strengthened disciplinary monitoring turns the state into a whipmaster, who thoughtlessly and inefficiently exploits financial, intellectual and institutional resources. The excessive administrative intervention without proper funding adequate to the scope and profoundness of the reforms, major changes in the infrastructure and methods of control in conditions of facilitated labor migration within the Eurasian Economic Community will inevitably result in further intensive outflow of highly-qualified personnel that will significantly reduce the scientific and technical capacity of the country and will be a serious barrier to innovative development of Belarus.