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Long-term Innovation Priorities for Bashkortostan

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Purpose

The Ministry of Education and Science of the Russian Federation started systemic foresight activities aimed at different issues related to science, technology and innovation. Following development of national S&T priorities (see [1]), it launched a study to identify priority areas for innovation development for a pilot region – the Republic of Bashkortostan. The methodologies and design of the project are to be used as a pattern for other regions, whereas the results obtained contribute to the development of the regional programme of social and economic development.

Foresight in Bashkortostan: Identification of Regional Innovation Priorities

The foresight study of innovation priorities of the Republic of Bashkortostan was conducted in 2005-2006 as a pilot project aimed at developing and testing methodologies for building long-term innovation strategies at the regional level.

The foresight exercise was implemented by the Bashkortostan Foundation for Innovation Support and the Higher School of Economics (a Moscow based university). One of the key goals of the foresight study were to develop the lists of regional critical technologies and the most promising areas of their practical application, to identify key factors to foster innovation, increase competitiveness, strengthen existing and create new networks for knowledge transfer between enterprises and academic institutions.

Natural Resources for Sustainable Economic Development

The Republic of Bashkortostan (Bashkiria) is located in the Volga region of Russia (Fig. 1). Its population exceeds 4 million, of which 2.6 million live in urban settlements (more than 1 million in the capital city of Ufa). The republic possesses significant natural resources including oil, gas, coal, iron and copper ores, gold, salt, limestone and gypsum. Together with substantial raw materials and manufacturing industries it creates a solid basis for overall sustainable economic development.

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Fig. 1: Republic of Bashkortostan

Recent Economic Growth

For the last few years Bashkortostan has been demonstrating significant economic growth: in 1998-2005 the GRP and the volume of industrial production have grown by more than 50%. The major contribution to this growth has been made by the oil sector and manufacturing industries.

Low Level of Innovation Activity

Despite the relatively good position of Bashkortostan compared to most of the other Russian regions, the Republic's authorities consider that substantial economic potential, rich natural and human resources per se cannot secure future well-being of the region.

The low level of innovation activity, weak linkages between industries, R&D units and universities hamper regional development. The share of innovation products and services constituted only 4% of total sales and 1% of exports in 2005. Intramural R&D expenditure in the Republic did not exceed 0.5% of GRP. Even though the limited budget funds allocated on R&D are mostly distributed on the institutional basis (with respect to size of relevant R&D units) with a very small share of funds that are subject to competition.

The technology transfer networks are underdeveloped, and industrial enterprises prefer to purchase from abroad (sometimes obsolete) turnkey technologies despite the fact that in the region there exist world-class research teams.

How to Catch Up?

One of the key goals of the Foresight study was to identify key factors to foster innovation, increase competitiveness, strengthen existing and create new networks for knowledge transfer between enterprises and academic institutions.

The general objective of the project was to develop methodologies for identification of regional innovation priorities with respect to both regional peculiarities and national interests.

Among the specific tasks there were:

- assessment of Bashkiria's S&T and innovation capacities;
- benchmarking regional S&T potential against other Russian regions and the federal level;
- identification of key factors ensuring sustainable innovation development;
- selection of regional critical technologies and the most promising areas of their practical application;
- contribution to the regional strategy for social and economic development.

Finding the Balance between Regional and National Priorities

The set of methodologies was selected with respect to best available practices [2]. It was, on the one hand, based on a general approach and envisaged expert assessment of regional S&T and innovation capacities vis-à-vis federal S&T priorities in order to identify the breakthrough fields able to provide competitive advantages both to the regional enterprises and to Russia as a whole. On the other hand, the methods were customised for the region and included SWOT analysis and detailed studies of innovation demand (from regional enterprises for new technologies) and supply (capacities of regional R&D units and universities to develop relevant technologies).
A set of regional critical technologies was developed on the basis of SWOT analysis, interviews, expert surveys and brainstorming seminars. For each area an expert panel (15 to 20 leading researchers and specialists from industrial enterprises) was created that was engaged in the project activities during the whole period of its implementation.

The project design envisaged sequential use of particular methods with the aim to provide evidence-based analysis, maximum utilisation of expert knowledge, interaction and creativity by expert participation.

The whole foresight process was designed with respect to the national priority areas for S&T and critical technologies developed by the Russian Ministry of Education and Science and approved by the President of the Russian Federation in 2006 [1]. While developing the methodology of selecting the regional innovative priorities, consistency with the approaches applied earlier at the federal level (for details see [3]) was assured.

National critical technologies and relevant lists of the most promising goods and services (to be produced on the basis of those technologies) were examined with respect to regional socio-economic needs (demand side) and S&T capacities (supply side) of the R&D institutions and universities. Each critical technology was subsequently split into a set of particular technology fields, which were analysed by expert panels. Those of them that were expected to contribute to innovation development got the highest ranks and were used as a basis for the selection of priorities.

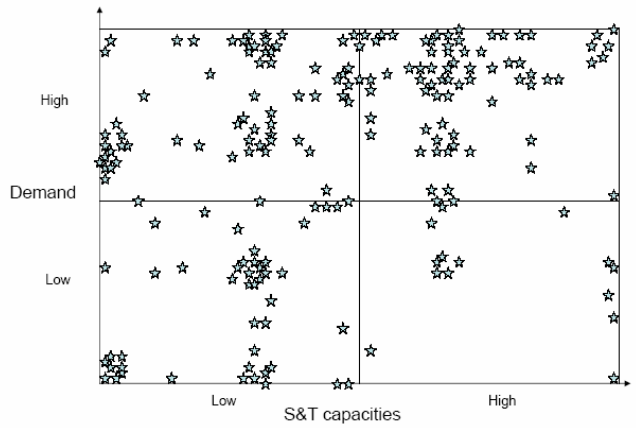

Fig. 2: National critical technologies vs. regional supply and demand

The analysis of 190 technology fields (which combined for 34 national critical technologies) has shown that most of them are either better developed and highly demanded or vice versa are underdeveloped and less demanded. It means that the regional S&T capacities are potentially well suited to meet needs of local industry and society (Fig. 2). Most of the exceptional cases (high demand and poor supply) were related to power generation technologies.

Seven Key Technology Areas

The following seven technology areas in bold letters have been chosen as the regional innovation priorities:
The work of expert panels has resulted in lists of regional critical technologies.

Information and telecommunication
Intellectual management systems
Processing, storing, transmission and protection of information
Distributed computing and systems
Production of software
Nanosystems and materials
Volume nanostructure materials
Surface nanostructure materials
Composite polymers and elastomers
Composite and ceramic materials
Membranes and catalytical systems
Living systems
Bioengineering and cell technologies
Enzymatic, bioartificial, biosynthetic and biosensor technologies
Biomedical and veterinarian technologies of life support and protection of human beings and animals
Medicines
Diagnostics, medical treatment, and preventive treatment of the diseases
Manufacturing
Mechatronics modules based equipment
Forming, thermal processing, control and assembly
Laser and plasma technologies
Energy
New and renewable sources of energy
Energy production from organic raw materials
Energy saving systems for transportation, distribution and consumption of heat and energy
Rational use of nature
Monitoring and forecasting the state of atmosphere and hydrosphere
Resource assessment and forecasting the state of lithosphere and biosphere
Processing and utilisation of technogenic wastes
Decreasing risks and damages of natural and technogenic catastrophes
Environmentally safe exploration of layers and extraction of minerals
Transport and aviation
Managing new generation transportation systems
Aviation engineering
Energy-efficient engines for transportation systems

Among the most promising societal and economic implications the experts indicated the following product groups:

ICT: software development tools, CAD/CAM/CAE for oil and gas well-drilling, power engineering and other applications, systems for data protection and distributed computing for GRID-technologies;

Nanosystems and materials: super strong, superfluid and other types of composites, nanostructural metals, implants, special instruments, fixing systems et al.;

Living systems: medicines, immune-modulators, biofertilisers, transgenic plants, biodiagnostic gadgets, biochips;

Manufacturing: equipment for processing engine components, processing high-alloy steel and metals, equipment on the basis of laser, nuclear and plasma technologies for production of materials, membranes and surfaces, gas-turbine engines for power engineering and gas-pumping;

Energy: gas turbines for electricity production, cooled perforated blades with multicomponent thermo barriers, energy saving equipment;

Rational use of nature: water preparation, supply and purification, non-invasive control systems, conservation of used oil wells, seismic profiling of oil stocks, biochemical decontamination of toxic wastes;

Aviation and transport: helicopters, engines for aviation, jet nozzles with controlled thrust vector, trolley buses.

For more detailed information see [4].

Impact of the Exercise: Promoting Key Industries

The Bashkortostan government has been developing a mid-term (up to 2015) strategy for social and economic development. The foresight project findings created a background for the strategy components related to S&T and innovation. Among the policy options considered by the regional government there are complex measures aimed at modernisation of major enterprises in key industries, designing efficient mechanisms for integration of S&T, universities and industries, introduction of new competition-based S&T programmes with participation of businesses. Relevant changes in regional legislation are planned aimed at promoting innovation activities, technological modernisation and diversification of the regional economy (transition from a predominantly fuel based economy to deeper processing of oil, gas and raw materials, increasing added value, introduction of high-tech products).

The list of regional S&T and innovation priorities will become one of the key components of the regional strategy. It will serve as a background for practical implementation of regional S&T and industrial policies. The success of the regional policies will to a large extent depend on their consistency with overall national strategies. The approach used for the foresight study allowed detailed expert analysis of what technologies the regional economy needs, which of them could be successfully developed in the Republic, and how Bashkortostan might coordinate its innovation strategies with neighbouring and other Russian regions.

A very important implication of the study was the need to build informal networks between major stakeholders in the region (the government officials, industrialists, S&T and education communities). The consensus on the key areas of innovation development achieved in the course of expert panels and other activities has created a platform for further concerted actions and for development of regional policies that are consistent not just with federal strategies, but can be agreed upon by all parties involved in their implementation.

Sources and References

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