

New challenges for Russian institutions of higher engineering education and their realisation through the priority national project

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ABSTRACT: Russia is presently undergoing a process of reform of its higher education system, with an attempt to restructure and modernise the provision of higher education to its population. Under this system, many Russian academic establishments have *become the centres of innovative activity in regions and in industrial sectors of practical business*. Since 2006, a project of national importance called *Education* has been carried out. Under this project, several programmes concerning the development of leading institutions of higher engineering education were financed on a competitive basis. The purpose was to raise the level of research and development, update and upgrade educational programmes and make provision for academic and professional mobility of academic scientific and pedagogical staff. The authors of this paper, who are actively involved in this initiative, endeavour to present an overview of this important national project with the objective of raising interest among the international engineering and technology community and to elicit their support for this undertaking.

INTRODUCTION

The transition to an innovative way of development, proclaimed in Russia, has created a new challenge to be faced by Russian institutions of higher engineering and technology education, in an attempt to become new centres of innovative activities and ventures in the geographic regions of Russia, as well as in business sectors and industrial enterprises. With this purpose in mind, a priority national project called *Education* is being realised in Russia since 2006. As a result of this project's programmes of intensive development of leading academic institutions of higher engineering education, it has been decided that such institutions should be financed on a competitive basis with the purpose being to raise the level of research and development, update and upgrade the educational programmes, and to make provision for academic and professional mobility of scientific, research and teaching staff. In 2009, the best scientific-research universities were selected by competition and their programmes of development were determined with the financial support provided by the state on a priority basis until 2018.

The main objective determined for these universities is to form and develop effective and innovative scientific-educational clusters on the basis of integration with academic science, small- and medium-sized innovative business enterprises and with large corporations as strategic partners. For the first time in Russian practice, the laws allowing universities to form endowment systems and foundations (to raise capital), and to establish enterprises of science-intensive business have been adopted, which has considerably raised the level of activities of university business-incubators and science- and techno-parks. Within the framework of special governmental programmes, scientific-technological centres in the field of nanotechnologies and nano-materials; powerful computer centres with supercomputers; centres for collective usage of unique research equipment have been established in an attempt to lead scientific schools to achieve measurable improvement of professional skills, as well as to support the mobility of academic and research staff.

In the contemporary world, the main competitive advantage of a highly developed country is its human potential, with education being the foundation for human resource development and capacity building that create the basis for the reproduction of science, innovation in technologies and development of culture as a whole. Institutions of higher engineering and technology education, therefore, play a very important and often a critical role in national educational systems because they are seen as:

- a source of a new knowledge and qualitative manpower resources;
- a significant element of innovative potential of society; and
- an intellectual basis for information systems of creation, reception, storage and transfer of technical knowledge.

At present, the value and significance of science, technology and engineering education, as the key factors of development of an innovative economy in Russia, are recognised in a number of policy-making state documents. The Government of the Russian Federation recently approved the document called *Priority Directions of Development of Educational System of the Russian Federation*, with the following primary tasks concerning:

- the improvement of the quality of vocational training;
- the development of an up-to-date system of continuous vocational training;
- the increase of investment appeal of higher education.

To achieve these priorities, a complex system of concrete measures was generated, aimed at achieving the perfection of the content and technology of education, the structure of the educational system, organisational and financial mechanisms and the legislative basis of education, as well as strengthening of the connections between education, science, manufacture and the labour-market.

This large-scale project will allow the testing and approving of a new model of establishing regional academic-scientific innovative complexes, and the realisation of the priority governmental support of those academic organisations which actively introduce innovative academic programmes. As a result of an open national competition, innovative programmes of 57 institutions of higher education have been selected; the general volume of their financial provision making up to about \$US2 billion. The duration of each programme is two years, and the amount of the state financial support provided over the entire period accounts to more than \$US40 million.

Alongside solving the problem of radical modernisation of the material-technical basis, which is undoubtedly urgent for all institutions of higher education, all the innovative programmes provide for development of a flexible *multilevel* system of training with the use of a modular structure of the academic programmes, systems of credit test units, effective methods of quality management, and active technologies of training in conditions of vigorously developing a modern information environment. Also, the important criteria of innovativeness of new and modernised educational programmes are their strong orientation towards priority directions of development of science, techniques and technologies, as well as the assurance of their conformity and compliance to real needs of the labour market.

The major result of the perfection of educational programmes is the development of methodical and material-technical provisions for new *Masters* programmes, created in collaboration with the strategic partners in key professional sectors of industry. It is hoped that innovative scientific-methodical decisions, received by higher educational institutions within the framework of the priority national project, will affect the new generation of state educational standards, and that, in turn, will create *the significant system result of the national project*.

The orientation of the innovative educational programmes of engineering and technical universities towards the provision of scientific achievements and personnel for priority directions for the development of techniques and technologies is the reason why the performance of academic projects on purposeful formation of basic knowledge on innovative management in the sphere of high technologies, management of life cycle of high technology production, marketing and commercialisation of research results (for graduates, academic staff and business-partners) has been included in the complexity of problems being solved under the priority national project.

Except for educational innovations proper, it is anticipated that the significant results of projects in higher educational institutions will be *transformations in the scientific-technological sphere*, which will allow the raising of the level of involvement of academic staff and students in innovative activity, to provide updating of training on the basis of integration of training, scientific research and real professional practice.

Within the framework of the priority project, essential transformation of the institutional structure of Russian universities, participants of that project, was carried out, and elements of an innovative infrastructure with participation of regional authorities and strategic business-partners were formed. The material, technical and technological base of innovative divisions is formed, to a considerable degree, on the conditions of private-state partnership and, as a rule, it has a *double purpose*: educational process and scientific-innovative development of market orientation.

The effective dissemination of the best practices within the higher educational institutions, participants of the project, will be used to increase their innovative activity and investment appeal through:

- competence centres;
- centres for collective usage of equipment;
- scientific-educational centres;
- scientific testing areas and training grounds;
- business incubators;
- science- and techno-parks;
- mechanisms of private-state partnership;
- interaction with zones for adaptation of new technologies, etc.

These have an enormous value for the increase of innovative potential of the higher academic establishments as a whole.

The investment appeal of higher educational institutions to their strategic partners, formed in the process of realisation of the priority national project and conditioned by the interest of those partners in highly skilled specialists and in timely and topical scientific and technological developments, serves as a guarantee of stability, continuation and elaboration of results of the priority national project being considered here.

The governmental support of system measures concerning further development and distribution of innovative practices throughout the Russian higher engineering organisations is of decisive importance. The *Federal target programme of education development* is one of the sources of resource support for the innovative *educational projects*, aimed at the perfection of the content of education, academic and information technologies, management and network interaction in higher educational institutions. The support and development of *scientific research and innovative infrastructure*, created by institutions of higher engineering education and effective functioning on regional or industry branch scales, is also carried out within the framework of several other federal target programmes such as:

- Research and design in priority directions of development of the Russian scientific-technological complex;
- National technological base of the Russian Federation;
- Scientific and scientific-pedagogical personnel of the innovative Russia;
- Development of infrastructure for nano-industry in the Russian Federation.

In particular, in the most recent investment programme, substantial funds were allocated to 32 higher education institutions, all of which are the participants of the priority national project.

CONCLUSIONS

The stimulating role of the priority national project is the basis for further use of principles of targeted governmental support for innovative transformations in the system of higher engineering schools. In 2009, 14 best scientific-research universities were chosen in a national competition so that their programmes of development will be supported by the state on a priority basis until 2018.

The volume of financing of each programme for the first 5 years makes up to \$US60 million. The tasks, assigned to these universities, are to establish effective scientific-educational clusters of an innovative orientation on the basis of integration with academic science, small and medium-sized innovative business enterprises and large corporations as strategic partners.

Also, for the first time in Russian governance, the laws allowing universities to form endowment (the target capital) and to establish enterprises of science-intensive business have been adopted. These laws will permit the universities to establish business-incubators and techno-parks within the universities, in partnership with industry, commerce and financial organisations. Within the framework of the special governmental programmes, scientific-technological centres in the field of nanotechnologies and nano-materials, powerful computer centres with supercomputers, and centres for collective usage of unique research equipment will be created to facilitate leadership activities in those universities, and to create measures for the improvement of professional skills and the mobility of their academic and research staff.

The Russian Association of Engineering Universities (RAEU), with its considerable intellectual manpower, is proud and honoured to be involved in this new and exciting initiative and is determined to contribute to its success.