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## ВЕСТНИК

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### **FORMING OF RESEARCH UNIVERSITIES: EXPERIENCE OF RUSSIAN FEDERATION AND REPUBLIC OF KAZAKHSTAN**

**Abstract.** The article is devoted to analysis of innovative activity in the modern system of higher education of universities in Kazakhstan and Russia. An important direction of increasing the efficiency of national innovation system's functioning is the formation of a new institutional form of organizing scientific and educational activities based on implementation of the programs for the development of the national research universities (NRUs). Competent integration of education, science and industry, the qualitative development of postgraduate education on the basis of the modern achievements of science and technology are the key to solve the emerging problems and at the same time they are one of the priority areas of economic development.

In the paper there is a comparative analysis of organized NRUs both in Kazakhstan and Russia which leads to the conclusion the main effect of implementation of universities development programs related to the category of «national research university» is in forming university complexes in the field of high-tech world-class technologies that can realize the potential of science and ensure education of the highly qualified scientific and technical personnel in priority areas of modernization and technological development of these countries. NRUs should become the basic elements of innovation system optimally using their infrastructure capabilities for the successful transfer of the scientific achievements in business and using of innovation in country's economic growth.

**Key words:** national research universities, innovative development, science, national innovation system, Russian Federation, Republic of Kazakhstan.

**Introduction.** Since the end of the 20th century the developed countries of the world have had a distinct tendency to reduce the government spending on higher education, which challenged many universities to seek the new sources of financing through innovation and the commercialization of R&D. The competent integration of education, science and industry, the qualitative development of postgraduate education on the basis of the modern achievements of science and technology are the key to solve the problems that have emerged and at the same time one of the priority directions of economic development. In the formation of the national innovation system the significant role is assigned to universities which aimed at educating students and conduct the research and innovation activities. The active research activities of universities directly affect the quality of education of the future specialists involved in the research and development, and, accordingly increase the competitiveness of university. The scientific potential of universities which had been formed over the decades got the further development in the modern policies of many countries and the new mission of universities in innovative economy.

An important direction of increasing the efficiency of the national innovation system's functioning is the formation of a new institutional form of organizing the scientific and educational activities based on

implementation of the programs for the development of national research universities (NRUs). Practically NRU should be an integrated scientific and educational center or include a number of such centers in the form of the structural units carrying out the scientific research work and educating of the scientific personnel. The research university is a symbiosis of educational and research institutes, a higher educational institution that equally effectively carries out educational and scientific activity on the basis of integrating science and education principles.

It is well known the experience of scientific innovative activity of the best world research universities of the USA [1, 2] which have the techno park structures, cooperation with industrial firms and consortiums, such universities as Massachusetts Institute of Technology (MIT), Stanford University having the considerable experience in the field of innovations [3, 4].

Globalization, the development of information technology, increasing of competition between universities fundamentally change the nature of scientific knowledge production. The most important distinctive features of research universities are the ability to generate knowledge and transfer them effectively to economy, conduct the research on a wide range of areas as well as the availability of a highly effective system of specialists' education [5].

Universities should have profit from the commercialization of their own scientific developments in order then to invest their profits in scientific infrastructure and the basic research. From this point of view, Russia's experience in forming national research universities is of a great interest [6].

By the Decree of the President of Russian Federation No.1448 «About implementation of the Pilot Project for Establishment of National Research Universities» in 2008 the first NRUs were established [7]: National Research Nuclear University (based on Moscow Engineering Physics Institute) and the National Research Technological University based on State Technological University «Moscow Institute of Steel and Alloys».

In 2009-2010 according to the results of the competitive selection of the development programs 29 universities of the Russian Federation were assigned the category of «National Research University» (Table).

As it is seen from Table 1 [8] these universities include 11 leading universities in Moscow and 4 from St. Petersburg, the remaining 14 universities represent the different regions of Russia. Among them are: 9 classical universities, 17 universities of engineering and technical profile, one medical and one is with economic profile.

The formation of NRUs in Russia was dictated by the need to implement the serious projects for the development of a high-tech sector of economy. Among indicators for the development programs of national research universities' effectiveness, besides the traditional indicators of education, science and research, there also were some indicators of a general condition as well as indicators for the development of university innovative entrepreneurship. To develop the high-tech sector of economy there were identified five priority areas of innovative development. They are following:

- 1) energy efficiency and energy saving;
- 2) nuclear technology;
- 3) space technology;
- 4) medical technologies;
- 5) strategic information technology [9].

In the framework of these priority areas for instance, N.Bauman Moscow State Technical University (MSTU) determined such important areas of university development where it has got the significant educational and scientific – technical development, for instance N.Bauman Moscow State Technical University for 2009-2018 identified such important areas for the development as following:

- 1) space technology;
- 2) biomedical engineering and technology of living systems;
- 3) nanoengineering and nanotechnology;
- 4) energy and energy efficiency;
- 5) information and communication technologies.

In the field of space technology Moscow State Technical University is a pioneer. Today, the significant scientific and research work is realized by the research and testing centers of Moscow State Technical University, such as «Power Engineering» and «Special Machine Building» and experimental work is due to the faculties of university.

According to the data of Ministry of Education and Science of Russian Federation

**National Research Universities of Russian Federation**

#	Name of the state educational institution (university)
1	State university – High School of Economics (Moscow)
2	Moscow Aviation Institute (State Technical University)
3	N. Bauman Moscow State Technical University
4	Moscow Institute of Physics and Technology (State University)
5	Moscow Power Engineering Institute (Technical University)
6	Moscow State Institute of Electronic Technology
7	Moscow State University of Civil Engineering
8	Russian State Medical University of the Federal Agency for Health and Social Development (Moscow)
9	M. Gubkin Russian State University of Oil and Gas (Moscow)
10	National Research Technological University
11	National Research Nuclear University
12	G. Plekhanov St. Petersburg State Mining Institute
13	Saint-Petersburg State University of Information Technologies, Mechanics and Optics
14	Saint-Petersburg State Polytechnic University
15	Institution of Russian Academy of Sciences
16	Tomsk Polytechnic University
17	N. Lobachevsky Nizhny Novgorod State University.
18	Belgorod State University
19	Irkutsk State Technical University
20	Kazan State Technological University
21	N. Ogarev Mordovian State University
22	A. Tupolev Kazan State Technical University
23	Perm State Technical University
24	Novosibirsk State University
25	Perm State University
26	Academician S. P. Korolev Samara State Aerospace University
27	N. G. Chernyshevsky Saratov State University
28	Tomsk State University
29	South Ural State University

In the field of biomedical engineering and living systems technology, education of bioengineers at MSTU has been conducted since 1998. The Faculty of Biomedical Engineering was the first in Russia to graduate the specialists in this field. In 2005 the university established the Research and Testing Center for Biometric Technology.

The core of nanotechnology center is a complex of laboratories with the latest equipment for the research in the field of nanotechnology.

In 2013 University opened the scientific and educational center for plasma research and ion-plasma technologies which hasn't got any analogues in Russia. Plasma is associated with implementation of many energy projects such as, for example the controlled thermonuclear fusion. Specialists of MSTU are carrying out the research in the field of anomalous phase transitions of the metals which make possible the usage of a metal as a source of energy.

The scientific and educational complex «Informatics and Control Systems» of MSTU provides education of a highly qualified engineering and scientific staff specializing in areas of scientific and technical knowledge that are associated with the formation and implementation of the newest models of computer technology, automation and control systems. In this direction also functions the scientific and educational center «Supercomputer Engineering Modeling and Software Complex Development» [10].

It should be noted that today many NRUs of Russia have got a mission in dissemination of advanced knowledge and information technologies, preparation of intellectual elite of the society on the basis of integrating science and education, innovative approaches in accordance with the personnel technological demands of the national economy [11].

Interregional space complex was established for rendering the communication services at National Research Tomsk State University (TSU) considering an exceptional importance of information and communication technologies in providing a high level of educational, scientific, innovative and communication activities.

TSU officially possessing the status of NRU in Russian Federation has got a developed innovative infrastructure including an innovative technological business incubator and an "innovative belt" of 26 innovative companies that implement intellectual property of the university and serve as a base for educating and employment of the graduates.

The following priority technological directions of development were defined in University Development Program:

- Personnel, scientific and technological innovation support in the field of nanotechnology and materials;
- personnel, scientific and technological innovation support in the field of information, telecommunication and supercomputer technologies;
- personnel, scientific and technological innovation support in the field of rational nature management and biological systems;
- personnel, scientific and technological innovation support in the field of advanced space design and missile artillery systems;

The work on human resources and scientific and innovative support in the field of nanotechnology and materials at Tomsk State University is based on the university's achievement of scientific and pedagogical schools in the field of physics of metals and engineering of semiconductors and dielectrics, optics and spectroscopy, radiophysics, fluid mechanics, gas and plasma, chemical materials science, catalysis. R&D performed at university with the participation of students, undergraduate and graduate students are focused on addressing such priority tasks as energy efficiency, the development of the new medical technologies, defense technologies while innovative-technological developments are being implemented at 11 small enterprises of university's innovation belt.

Tomsk State University was one of the first universities in Russia to start work in the field of computational mathematics, cybernetics, telecommunications and information technologies. R&D performed at university with the participation of students, graduate students were focused on addressing such priority tasks of economic modernization as the development of the new strategic computer technologies and software, space and medical technologies.

The work in the field of rational nature management and biological systems is based on the results of scientific schools activities in the field of biotechnology, molecular biology, geoecology, environmental economics, geoinformatics and environmental law.

University's personnel activity in the field of advanced space design and missile-artillery systems was aimed at carrying out the fundamental and applied scientific research and educating specialists in the field of high-tech enterprises of the defense complex and forming scientific and technical bases for designing



the new-generation spacecraft and weapons systems using modern computing and experimental technologies. At the same time university's position was supported by accelerating development of interdisciplinary research centers many of which cooperated with academic and industrial partners not only in Russia, but also abroad [12].

Novosibirsk State University (NSU) can also be considered as a good example of forming of NRU. The aim of NSU Development Program was to modernize university's innovative infrastructure in order to ensure its integrity and interconnection for educating of the graduates with an innovative worldview and for effective realization of scientific intensive innovative projects with a potential for commercialization [13].

The program for the formation of innovative research university included the following issues:

- development of existing and creation of the new objects of innovative infrastructure;
- equipping of existing and the new objects of innovative infrastructure with the modern equipment;
- legal protection of intellectual activity results (patenting);
- development and implementation of training and professional development programs for personnel in the field of innovative entrepreneurship;
  - Internships and professional development of university staff in the field of innovative entrepreneurship and technology transfer in foreign universities with effective innovative infrastructure (Germany, France, United Kingdom, USA, South Korea, Japan);
  - Consulting services of foreign and Russian experts in the sphere of technology transfer;
  - Creation and development of innovative start-ups.

A brief analysis of the Development Programs of above-mentioned national research universities in Russia allows to conclude the research universities in Russian Federation are some kind of the locomotives for the development of industries in an innovative oriented scenario accompanied by the modernization. And the certain structural changes as well as their effectiveness depend significantly on human and scientific support.

One of the priority directions of higher education development in the Republic of Kazakhstan is also its participation in the formation of country's innovative economy, development and introduction of promising innovative technologies.

At the present time a full-scale structural reform of higher education and university science is taking place in Kazakhstan. In accordance with the State Program of Education development in the Republic of Kazakhstan for 2011-2020, the goal of the state policy in the field of the development of science and technology proclaimed the transition to innovative development of the country through adaptation of the scientific and technical complex to the conditions of a market economy and to improve the effectiveness of its results [14].

Innovations were identified as a strategically important direction for the development of the Republic of Kazakhstan. Initially, the issues of innovative development were reflected in the Strategic Plan until 2010 [15], then in the Strategy for Industrial and Innovative Development for 2003-2015 [16], the Program for the Formation and Development of the National Innovation System of the Republic of Kazakhstan for 2005-2015 [17].

A new impetus for the development of innovations was done with the launch of the State Program for Accelerated Industrial and Innovative Development of the Republic of Kazakhstan for 2010-2014 [18] approved by the Decree of the President of the Republic of Kazakhstan dated March 19, 2010 No. 958 (hereinafter - SPAIID for 2010-2014). Also were adopted interindustry plan on the development of innovations and facilitating of the technological modernization for 2010-2014 [19] as well as Interindustry Plan of the Scientific and Technological Development of the Country until 2020 [20].

By the Decree of the President of the Republic of Kazakhstan No. 579 in 2013 was approved the «Concept of Innovative Development of the Republic of Kazakhstan until 2020» [21].

In the context of the global competition the importance of the research universities for the development of the scientific and innovative system of the country is growing. And one of the main factors is the support of a knowledge based economy. Formation of a network of the research universities in the Republic of Kazakhstan is defined as one of the most important events in the Address of the President of the Republic of Kazakhstan, N. Nazarbayev, «Kazakhstan in the New Global Reality: Growth, Reforms, Development». In his message the Head of the State noted «... Innovative potential of Kazakh economy

should be increased. It is important to have a base for the foundation of building future economy. It is necessary to develop competencies in the sphere of the smart technology, artificial intelligence, integration of cyberphysical systems, future energy, design and engineering». This can only be done by building an effective scientific and innovation system. It will be based on the powerful research universities and innovative clusters formed on the basis of the high-tech park «Astana Business Campus» of Nazarbayev University and «Alatau Technological Park» in Almaty [22].

Within the strategic goal set by the Head of State to build an effective scientific and innovative system in Kazakhstan, the formation and development a network of research universities is in the process. It also was developed a legislative basis for their formation [23]. By the Resolution of the Government of the Republic of Kazakhstan No. 957 dated June 20, 2009, a non-commercial joint-stock company «New University of Astana» was established with 100% state participation in its authorized capital [24].

At the present stage there is a formation of the research universities in the country. In 2010 according to the contest there were determined 10 innovation-oriented universities and later these universities are expected to be transformed into the nationally-research universities.

By the Decree of the Government of the Republic of Kazakhstan No. 1051 on December 24, 2015 Nazarbayev University was awarded the status of the research university and approved its Development Program for 2016-2020 [25]. The goal of Nazarbayev University initially established as the most important national project is to become the first research university of Kazakhstan since its activities are connected with implementation of country's key priorities including intensive development of the research potential, industrial and innovative development of the country and transition to education which meets the requirements of innovative economy. In order to achieve this goal the university urgently needs to have a close cooperation of science and industry as well as serve as a model for the provision of health services.

The integrated scientific system of Nazarbayev University includes the following schools: National Laboratory Astana (NLA) and Nazarbayev University Research and Innovation System (NURIS) which generally provide a connection between academic process, the research activities and the development of proposals and recommendations for implementation of research and development in industry.

NURIS is challenged with the task of creating an intellectual-innovative cluster of Nazarbayev University within the development of high technologies and high-tech companies. The main objectives of NURIS are the implementation of activities in the field of science and education including research, scientific, technical and educational activities, as well as providing with technical and research facilities of the university.

One of the priority directions of NURIS is the creation of intellectual-innovative cluster of university designed to ensure the development of the high-tech companies around the university, creating favorable conditions for the scientists, attracting investments in the new technological research at university, developing engineering potential in Kazakhstan, transferring and commercializing the newest technologies, creating of the new jobs for graduates of Nazarbayev University.

The key elements of the cluster are schools and the research centers, commercialization office, business incubator, techno park and Astana Business Campus science park. In the scientific park will be carried out engineering, experimental and investment activities.

NLA's priorities include the research in the fields of energy, life sciences, earth sciences, information and telecommunications technologies.

Currently at Nazarbayev University the significant scientific research using the latest technologies and equipment for solving the scientific problems are conducted within the framework of the national priorities defined by the Higher Scientific and Technical Commission at the Government of the Republic of Kazakhstan. They are:

- 1) rational usage of the natural resources, processing of the raw materials and the products;
- 2) power engineering and machine building;
- 3) information and telecommunication technologies;
- 4) life sciences.

The main areas of the research in the field of energy are the fundamental applied research in the field of the renewable energy technology, energy saving, high-energy physics and technology, the numerical modeling of country's energy balance and its impact on the climate and environment.

Within the priority of «Life Sciences» the significant research is being conducted in such area as genomic and personalized medicine, regenerative medicine and artificial organs, cellular therapy and innovative cellular technologies. The vision of this priority is to improve the quality of life, health and human longevity by the practical introduction of the modern achievements of biomedical science into the clinical practice as well as economic diversification by means of a creation of the competitive biomedical industry in Kazakhstan.

Within the framework of «Earth science and the global environment» it is planned to create an advanced direction in the field of interdisciplinary research of earth sciences for managing all the resources for the sustainable development.

Information and Telecommunication Technologies sector is one of the fastest growing sectors of economy, both internationally and at the national level as well. In these areas the advanced researchers are carried out to address the actual issues of science and industry.

The university has got its own policy of the system of financing and supporting scientific work in accordance with the best practices of the research universities in the world. The core of the support and financing system of science at university are the joint projects of university professors and scientists.

The university has a modern system of organization and management of academic activity. A special feature of the academic management system organization is the availability of academic freedom and autonomy, the right to develop academic programs independently endowed with the Law as well as the existence of a clearly structured system of accountability.

It should be noted the strategic development of Nazarbayev University is based on international cooperation and partnership with the leading universities of the United States of America and Great Britain. Nazarbayev University uses the experience of its partners in the development of all three educational programs (bachelor's, master's and doctoral), management of scientific and educational processes as well as in the field of scientific research development.

In 2015 Nazarbayev University passed the certain landmark. The first graduation of 594 young highly qualified specialists (there were 446 bachelors and 148 masters). In 2015 the National Laboratory of Astana at Nazarbayev University implemented more than 100 research projects involving the financial resources of the national and international organizations and companies (the World Bank, the European Commission and the British Council).

Today Nazarbayev University is the first university in Kazakhstan functioning in accordance with international standards where the world experience is used in the formation of national research universities. Currently experience of Nazarbayev University is actively adopted by the other universities in the Republic of Kazakhstan [26].

Considering the huge role of technical universities in technological modernization and innovative development of Kazakhstan as well as the current country's economy need in highly skilled personnel, especially in engineering and technical profiles in accordance with the Decree of the Government of the Republic of Kazakhstan No. 1330 dated December 19, 2014 in January 2015 it was decided to unite two Kazakh universities – Kazakh National Technical University and Kazakh British Technical University- into the Kazakh National Research Technical University named after Satpayev (KazNRTU). The Action Plan for the establishment of KazNRTU was affirmed as well [27].

Dozens of educational and research institutions are concentrated in the new organizational structure of KazNRTU and more than 1000 scientists. At the present time the university carries out educational and scientific innovation activities in the new form considering the requirements of the state program of the forced industrial-innovative development. Priorities for university are education and scientific research work in the mining, metallurgical and oil and gas industries of the country.

Scientific and innovative activities of KazNRTU are directed to the development of the fundamental and applied scientific research in five priority scientific areas of the country as well as to the development of technical innovations and resource-saving technologies oriented at scientific and technological support of the priority sectors of economy within the framework of the State Program of forced Industrial and Innovative Development of the Country and Global Challenges of the XXI century. The university has got a unique infrastructure of scientific and educational centers and closely cooperates with the world's leading companies. Education process is conducted with the active use of the achievements of the world science and modern technology. It was formed a pool of leading scientists of the country carrying out the

fundamental and applied scientific and educational research. There are 16 offices of commercialization, 3 techno parks and 4 business incubators [28].

The Karaganda State Technical University (KSTU) should be mentioned as received the status of innovation-oriented university in Kazakhstan. Karaganda State Technical University is one of the largest technical universities in Kazakhstan, the development of which is carried out in accordance with the needs of economy of the country. In order to integrate education, science and industry, to improve the quality of specialists' education on the basis of KSTU was formed the first innovative-educational consortium «Corporate University» in Kazakhstan uniting 48 organizations, including universities, scientific institutions of Kazakhstan and Russia and the large industrial enterprises, such as JSC «ArcelorMittal Temirtau», «Sokolovsko-Sarbaiskoye ore mining and processing enterprise», «Shubarkol Komir», «Kazpromgeofizika», «Kazakhmys Corporation», «Bogatyr Komir», etc.

The consortium has given a powerful impetus to the development of scientific and technical activities: since its inception the volume of the contractual research work of university has increased almost 8 times, primarily due to interaction with enterprises of the corporate university. Employees and lecturers of KSTU passed internship at the consortium enterprises whose employees also passed the training courses at university. In 2010 an innovative scientific and technical complex was formed at KSTU including 7 research institutes, 23 research laboratories, 3 research centers, an engineering laboratory and the Polytech techno park which includes 6 research laboratories and 4 innovative enterprises with the significant scientific achievements and experience of innovative activity [29].

Scientific and research activity of L.N. Gumilyov Eurasian National University (ENU) aims at the further development of university as a major scientific and research center of Kazakhstan, the development of scientific and pedagogical schools, the formation of a high-tech innovation infrastructure of university. The scientific research conducted within the framework of the priority directions of science development fully correspond to the recommendations of the Ministry of Education and Science of the Republic of Kazakhstan. These directions are defined proceeding from the purposes and priorities of the development of the country as a whole. The university currently takes one of the leading positions in Kazakhstan's ranking of the leading universities and its foundation is based on the innovative technological approach and the use of the latest technologies. Formation of university as an international institution sets the practical tasks for carrying out the fundamental research on the priority areas for the development of science and technology. Considering it, the general direction of the research activities of the university is participation in solving the basic problems of the fundamental science, as well as the priority directions of the industrial and innovation policy of the Republic of Kazakhstan.

The priorities of industrial and innovation policy according to the Strategy of Industrial and Innovative Development of the Republic of Kazakhstan are the development and creation of potentially competitive including export-oriented industries operating in the various non-raw materials sectors.

The developed priority directions of the technological development are based on the main scientific directions of the natural science profile which are reflected in the activities of scientific centers and university institutes.

Due to the development of scientific schools in natural sciences and humanities more than 160 scientific projects on the fundamental and applied research programs are being implemented on the basis of established scientific centers and institutes.

The scientific schools in the field of bioorganic chemistry, molecular and cellular biology, mathematical modeling and innovative and high technologies, physics are actively functioning and successfully developing at the university. As a result of the development of scientific schools and activity of the centers and institutes the effectiveness of university's fundamental research increases as well as expanding the rising issues of the practical research and educational programs and projects that provide competitiveness and demand of the scientific potential of Eurasian National University [30].

The practical implementation of the main priorities identified in the Address of the President of Kazakhstan N. Nazarbayev to the people of Kazakhstan «Third Modernization of Kazakhstan: Global Competitiveness» concerning the creation of economic growth's new model is realized by Al-Farabi Kazakh National University for the past several years.

By establishing the close cooperation between science, education and industry, implementation of the scientific and innovative projects related to the development of an open communication platform for

evaluation of enterprises' personnel in the country is carried out at the university. Also there is an organization of computer tests for the technical data on urban traffic with the creation of the software tools and design of the geotechnological range and calculation of optimal modes for operation of the mineral deposits developed by underground leaching method etc.

With the support of the Ministry of Education and Science of the Republic of Kazakhstan based on many years of experience in scientific research Kazakh National University (KNU) continues to implement the project in order to form an Innovation Cluster within the framework of the Public-Private Partnership Program aimed at improving the scientific and innovative activities through integration of education, science and innovative production. Over the past three years Kazakh National University has successfully carried out a comprehensive modernization in all areas. Possessing the huge scientific potential and modern infrastructure Kazakh National University becomes the «growth point» of country's innovative economy [31].

Thus, today on the example of Nazarbayev University, KazNRTU, KSTU, ENU and KazNU, it's possible to state since the beginning of 2000 the Government of Kazakhstan has taken a number of steps designed to radically improve the situation in the higher education system as a whole and to stimulate its involvement in solving urgent problems of building innovative economy. One of such steps taken by the Government of the Republic of Kazakhstan was the decision to form a new category of universities in Kazakhstan such as national research universities effectively carrying out educational and scientific activities on the basis of the principles of science and education integration.

It should be noted for the transition to the category of national research university the universities must achieve certain indicators in the field of innovative entrepreneurship.

According to G. Stevenson's definition [32], «An entrepreneurial university is university that systematically makes efforts to overcome limitations in three areas such as generating knowledge, teaching and transforming knowledge into practice by initiating the new activities, transforming the internal environment and modifying interaction with the external environment». The meaning of this definition is that three components of economy (universities, business and the state) work in one bundle and ensure introduction of innovation and economic growth. Thus as it's seen for the development of industry abroad, the research potential of universities is actively used.

Students and university staff of an entrepreneurial university are entrepreneurs themselves participating in the formation of the new industries and the new companies. Graduates who deal with the real business do not tear their ties with university, but on the contrary develop and strengthen them.

In particular in the case of the development of «service», a department is functioning as a center aimed at attracting the financial resources to university by implementation of the business projects. Later, when the created unit develops some activities in this direction and, consequently recruits and acquires the necessary equipment it receives its step-by-step development. At first is the scientific component of activity (through the formation of a scientific school), and then the educational one (through the creation of the department). As an example showing the university not only educates the personnel for innovative economy, but also takes part in the various stages of creating innovations one can consider the activity of Almaty Management University (ALMA University) in Kazakhstan formerly known as the International Academy of Business (MAB).

In the nearest future the university will become an «incubator» for opening its own business by students, employees and teachers of the university. It is important to note that ALMA University plans to solve not only technical and commercial, but also social problems. The University plans to open the School of Social and Economic Sciences, the School of Art Management and the School of Computer Science in addition to the existing School of Public Policy, the School of Law, and the School of Business. This approach allows to introduce the principles of self-financing to the created structural units in a relatively short period of time [34].

The development of innovative infrastructure is of great importance at universities of Kazakhstan and Russia mentioned above.

Intellectual property and scientific and technical information departments, student business incubators and start-up centers, innovation and technology centers, project appraisal centers responsible for the technological and economic audits are being created at universities. The creation and organization of additional innovative infrastructures allows solving the complex tasks for the commercialization of the

research and development results - from the formation of a team and a business model to the search of the venture financing.

It is also important to note that the development of academic staff is one of the most difficult tasks on the formation and development of the NRU. This is due in particular to the aging and decline of a highly qualified part of university staff's activity as well as the shortage of young professionals and specialists. For a full-fledged development of the teaching staff and staff of NRU with the qualified personnel it is necessary to meet the following conditions: 1) the formation and implementation of a system to stimulate the current composition of academic staff at university; 2) election of the future faculty staff among the youth; 3) invitation to the university of the prominent scientists working in other scientific and educational centers and companies including the abroad ones.

The above comparative analysis of organized NRUs both in Kazakhstan and in Russia leads to the conclusion that the main effect of university development programs' implementation assigned with the category of «national research university» is in forming the university complexes in the field of high-tech world-class technologies that can realize a real potential of science and ensure the further graduation of a highly qualified scientific and technical personnel in the priority areas of modernization as well as the technological development of these countries. NRUs should become the basic elements of innovation system that optimally use their infrastructural capabilities for the successful transfer of scientific achievements into business.

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### ЗЕРТТЕУ УНИВЕРСИТЕТТЕРІНІҢ ҚҰРЫЛУЫ: РЕСЕЙ ЖӘНЕ ҚАЗАҚСТАННЫҢ ТӘЖІРИБЕСІ

**Аннотация.** Мақала Қазақстан және Ресей университеттерінің жоғары білім берудің заманауи жүйесіндегі инновациялық қызмет әрекеттерін талдауға арналған. Ұлттық инновациялық жүйенің жұмыс істеу тиімділігін арттырудың маңызды бағыты ұлттық зерттеу университеттерінің (ҰЗУ) даму бағдарламаларын жүзеге асыру негізінде ғылыми және білім беру қызметін ұйымдастырудың жаңа институттық формасын құру болып табылады. Білім берудің, ғылым мен өндірістің сауатты интеграциясы, ғылым мен техниканың заманауи табыстары негізіндегі жоғары оқу орнынан кейінгі білімнің сапалы дамуы туындаған міндеттерді шешудің кілті және сонымен қатар, экономиканы дамытудың басым бағыттарының бірі болып табылады.

Қазақстандағы да, Ресейдегі де ұйымдастырылған ҰЗУ-дың салыстырмалы талдауы оларға қатысты «ұлттық зерттеу университеті» санаты белгіленген университеттердің даму Бағдарламасын жүзеге асырудағы басты нәтиже осы елдердегі жаңғырту мен технологиялық дамудың басым бағыттары бойынша ғылымның әлеуетін көрсететін және жоғары білікті ғылыми-техникалық кадрларды дайындауды қамтамасыз ететін әлемдік деңгейдегі ғылымды қажетсінетін технологиялар саласында университеттер кешенін қалыптастырудан тұратыны туралы қорытынды жасауға мүмкіндік береді. ҰЗУ бизнеске ғылыми жетістіктерді табысты

трансферттеуде және елдің экономикалық өсіміне инновацияларды енгізуде өзінің инфрақұрылымдық мүмкіндіктерін оңтайлы пайдаланатын инновациялық жүйенің негізгі элементі болуы тиіс.

**Түйін сөздер:** ұлттық зерттеу университеттері, инновациялық даму, ғылым, ұлттық инновациялық жүйе, Ресей Федерациясы, Қазақстан Республикасы.

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### **СОЗДАНИЕ ИССЛЕДОВАТЕЛЬСКИХ УНИВЕРСИТЕТОВ: ОПЫТ РОССИИ И КАЗАХСТАНА**

**Аннотация.** Статья посвящена анализу инновационной деятельности в современной системе высшего образования университетов Казахстана и России. Важным направлением повышения эффективности функционирования национальной инновационной системы является формирование новой институциональной формы организации научной и образовательной деятельности на основе реализации программ развития национальных исследовательских университетов (НИУ). Грамотная интеграция образования, науки и производства, качественное развитие послевузовского образования на основе современных достижений науки и техники являются ключом к решению возникших задач и вместе с тем и одними из приоритетных направлений развития экономики

Приведенный сравнительный анализ организуемых НИУ как в Казахстане, так и в России, позволяет сделать вывод, что главный эффект от реализации Программ развития университетов в отношении которых установлена категория «национальный исследовательский университет», состоит в создании университетских комплексов в сфере наукоемких технологий мирового уровня, способных реализовывать потенциал науки и обеспечить подготовку высококвалифицированных научно-технических кадров по приоритетным направлениям модернизации и технологического развития этих стран. НИУ должны стать базовыми элементами инновационной системы, оптимально использующими свои инфраструктурные возможности для успешного трансферта научных достижений в бизнес и внедрения инноваций в экономический рост страны.

**Ключевые слова:** национальные исследовательские университеты, инновационное развитие, наука, национальная инновационная система, Российская Федерация, Республика Казахстан.



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