КОНЦЕПЦИЯ УНИВЕРСИТЕТ 3.0: ПЕРСПЕКТИВЫ РЕАЛИЗАЦИИ В РОССИИ В УСЛОВИЯХ НОВОЙ ТЕХНОЛОГИЧЕСКОЙ РЕВОЛЮЦИИ

UNIVERSITY 3.0 CONCEPT: PROSPECTS FOR IMPLEMENTATION IN
RUSSIA UNDER THE CONDITIONS OF A NEW TECHNOLOGICAL
REVOLUTION

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Аннотация:

В статье анализируются перспективы и проблемы реализации в России модели Университета Национальной технологической инициативы (НТИ) – отечественного варианта концепции Университет 3.0, которая получила широкое международное распространение в условиях новой («четвёртой») технологической революции. Согласно этой концепции, университетам присваивается «цифровой код» с учётом числа их миссий. Статус Университет 3.0 получает вуз, где к двум традиционным миссиям – образовательной и научно-исследовательской – добавляется третья: коммерциализация знаний и технологий. Университеты «третьего поколения» формируют предпринимательские экосистемы, перспективные технологические рынки и обеспечивают глобальную конкурентоспособность отечественной экономики. Поскольку одним из важнейших рынков будущего является HealthNet (распределённые системы высокотехнологичных медицинских услуг), модель (НТИ) актуальна и для медицинских вузов.

В статье прослеживается становление

Abstract:

The article analyzes the prospects and problems of implementation in Russia of the University model of the National Technological Initiative (NTI) – the domestic version of the concept of University 3.0, which has gained wide international distribution in the context of the new (“fourth”) technological revolution. According to this concept, universities are assigned a “digital code” based on the number of their missions. A university receives the status University 3.0, where a third one is added to two traditional missions – educational and research: the commercialization of knowledge and technology. Third-generation universities form entrepreneurial ecosystems, promising technology markets and ensure the global competitiveness of the domestic economy. Since HealthNet (distributed systems of high-tech medical services) is one of the most important markets of the future, the model (NTI) is also relevant for medical universities.

The article traces the emergence of the concept of University 3.0 in the system of university education in the USA and Europe. It analyzes the institutional processes that have prepared

концепции Университет 3.0 в системе университетского образования США и Европы. Анализируются институциональные процессы, которые подготовили активное участие ведущих университетов США, Великобритании, Китая в инновационной деятельности, коммерциализации знаний и технологий. Особое внимание уделяется проблемам модернизации ведущих российских вузов, которые пока не соответствуют требованиям статуса Университет 3.0 или Университет НТИ. Исследуются барьеры, препятствующие их участию в коммерциализации результатов интеллектуальной деятельности, в решении ключевых задач новой технологической революции. В качестве главных рассматриваются два тесно связанных барьера: отсутствие эффективного механизма взаимодействия между сферой изобретений и открытий и сферой бизнеса, а также недостатки российского законодательства об интеллектуальной собственности. В последнем не определен механизм распределения вознаграждения между субъектами правоотношений по поводу коммерческой реализации интеллектуальной собственности.

В статье делается вывод, что участие России в новой технологической революции в числе прочих условий требует модернизации деятельности ведущих российских вузов, а для этого необходимы глубокие институциональные преобразования.

Ключевые слова:

концепция Университет 3.0, Университет НТИ, миссии университета, коммерциализация знаний, интеллектуальная собственность, новая технологическая революция, перспективные технологические рынки.

the active participation of leading universities in the United States, Great Britain, and China in innovation, the commercialization of knowledge and technology. Particular attention is paid to the problems of modernization of leading Russian universities, which do not yet meet the requirements of the status of University 3.0 or the University of National Technological Initiative (NTI). Barriers hindering their participation in the commercialization of the results of intellectual activity, in solving the key tasks of the new technological revolution are investigated. Two closely related barriers are considered as the main ones: the lack of an effective mechanism of interaction between the sphere of inventions and discoveries and the business sphere, as well as the shortcomings of Russian intellectual property legislation. The latter does not define a mechanism for the distribution of remuneration between legal entities regarding the commercial sale of intellectual property.

The article concludes that Russia's participation in the new technological revolution, among other conditions, requires modernization of the activities of leading Russian universities, and this requires deep institutional change.

Keywords:

University 3.0 concept, NTI University, university missions, knowledge commercialization, intellectual property, new technological revolution, promising technology markets.

The main tasks of the Russian system of higher education in our time are determined by the need to include Russia in a new technological, or so-called "fourth industrial" revolution, which has already entered the civilized world. The content of

this revolution is the transition from mass standardized production to flexible, high-tech production of customized products based on the latest technologies. The latter include quantum technologies, new and portable energy sources, wireless communication technologies, big data, distributed registry systems, robotics, neurotechnology, artificial intelligence, virtual and augmented reality technologies, technologies for controlling the properties of biological objects. The use of digitalization, computer-aided design, platform solutions is already radically changing the functionality of companies and the structure of markets. The release of fundamentally new products will lead to the disappearance of many old markets and will give life to the markets of the future, based on the principles of a distributed economy, i.e. on a global network of horizontal links between Autonomous institutional actors. The number of such markets – AeroNet (distributed systems unmanned aerial vehicles); MariNet (distributed system for Maritime transport without crew); AutoNet (distributed network of vehicles without driver); HealthNet (market distributed systems high-tech medical services); NeuroNet (distributed artificial elements of consciousness and mentality); EnergyNet (distributed power); FoodNet (the market of distributed systems for the production and delivery of food). According to experts, the peak of revolutionary technological changes will be in the 2020-2030-ies. By this time, not only the structure of the economy will be fundamentally updated, but also there will be a sharp polarization of countries, some of which will act as technological leaders, and others will be technological periphery [1-5].

At present, efforts are being made in our country at the level of the state and government to implement breakthrough technological development. To this end, the strategic program “national technology initiative”, designed for the period up to 2035, implemented national projects “Digital economy”, “Science”, “Education”, “Small business and support of individual entrepreneurial initiative” and others. In these circumstances, the priority tasks for Russia are the formation of the scientific base and the educational environment that can meet new technological challenges in the present and future, the training of centers for the generation of new technologies and new markets on the basis of leading higher education institutions, the implementation of projects to improve the global competitiveness of Russian universities. Universities of the future are called universities of the National technological initiative (universities of NTI) and are the Russian model of the University 3.0 [6-8].

The concept of University 3.0, which is now widespread in the international educational space, involves the assignment of a “digital code” to universities, taking into account the number of their missions. Thus, if the University is engaged only in educational activities, it is assigned the name of the University 1.0. Such a University provides the translation of knowledge, training and provides a social elevator. In the case of simultaneous execution of two missions – training and research – it acquires the

status of University 2.0. Its functions are the generation of new knowledge through research and consulting services for market players. University 2.0 carries out research on the orders of the industry and creates technology “to order”. Even higher status is typical for the University 3.0, where there is a third mission – the commercialization of knowledge and technology. Such a University manages intellectual property rights, forms an entrepreneurial ecosystem, promising technological markets, and turns into a platform for creating economic superiority of the country at the global level. It is these universities that determine the face of the modern technological revolution [9,10].

The concept of University 3.0 is based on the research of the University. Wissem, Professor of entrepreneurship and innovation, Delft University of technology (Netherlands). In his opinion, the content and number of missions of the modern University is changing for the following reasons: 1) increasing integration of theoretical and applied research, as the world's leading universities are increasingly in need of alternative public sources of funding and are therefore interested in cooperation with high-tech companies; 2) transition from monodiscipline to interdisciplinary research; 3) aggravation of the global competition of universities for the best students, teachers, contracts, for leadership in the practical implementation of inventions and know-how; 4) the desire of universities to extract new benefits from the knowledge they create, increasing their role in the implementation of public policy of economic growth; 5) the need to ensure the economic efficiency of universities in the new complex conditions; 6) experimentation with differentiation of mass and elite education programs in modern universities in connection with the mass influx of students [11].

Code 3.0 was assigned to the leading universities of the USA, Great Britain, China. They form an economic and technological environment that is 5-10 years ahead of reality. It is from this environment that companies grow, which in 10-15 years become the flagship of global business in new industries. In particular, graduates of such universities created Hewlett-Packard, Yahoo, Google. Universities 3.0 combine human and financial capital flows, become system integrators of the main processes of technological entrepreneurship within the innovation ecosystem, create inter-universities networks, hubs and networks for the exchange of technological competencies. Such universities become leaders not only in the formation of startups, but also in determining the trends of entire industries. For example, the American Carnegie Mellon University currently sets the key directions for the development of robotics. Thanks to the University of Cambridge, which joined forces with the business community and local authorities, was created Cambridgeshire – County, which became the world center of high-tech industries. To move to the University level 3.0, the University must have higher competencies in understanding the markets and the laws of their development than the corporate environment surrounding it. Only in this

case it will, like a magnet, attract the best representatives of the business community to implement joint innovative projects [12].

Let us trace the formation of the University 3.0 concept in modern countries. In general, the development of university education in the United States and European countries in the XX century was closely connected with scientific and technological progress. The growing demand of business for innovation has become a catalyst for innovation, in which universities are actively involved. It is important to take into account that in the second half of the XX century in the economy of developed countries finally developed natural mechanisms to stimulate innovation processes and products, without which the new mission of the third generation universities would be simply impossible. These mechanisms are based on venture companies and corporate venture funds that provide financial support to high-risk projects and startups. Currently, corporate venture funds account for 25% of the US venture capital economy. Thanks to their efforts, an effective system of interaction between the sphere of inventions and discoveries with the sphere of business has developed, ensuring the inflow into the economy and the rapid introduction of all promising technological ideas. We emphasize that the mechanisms to stimulate the development and implementation of innovative projects are based on well-developed legislation on intellectual property, which clearly defines the rights of all subjects of intellectual innovation, including universities, the order and proportions of the distribution of remuneration from the sale of intellectual property. It is also important that in the United States about half of the universities are private and have no restrictions on participation in business and commercial activities as intellectual property rights holders.

In the early 1980s, the United States and European countries experienced a reduction in the scope of state regulation of the economy and the public sector, and the role of market mechanisms increased. At this time, the autonomy of universities increased, their leadership began to have broader powers, the state demanded even from state universities economic efficiency, orientation to the demands of the labor market, the use of strategic planning. During this period, the institutional interaction of universities intensified, the functions of management began to be delegated both to the top, for example, in the EU, OECD countries, and to the regional level – in the UK, Italy.

In the 1990s, there was a division of missions of universities, their involvement in regional economic activities, in the implementation of research programs. Universities began to participate in public-private partnerships and supranational systems of socio-economic cooperation, to create joint research centers with scientific organizations, to integrate into scientific clusters, regional, national and international networks. At this stage, heterogeneous networks of education management were formed, actively influencing its development along with the state. In universities, the

management culture has increased, outdated forms of state control have disappeared, universities have gradually begun to turn into autonomously managed structures.

These processes were reflected in the new concepts of University governance, such as “new public management” (New Public Management, NPM), “network governance” (the Governance Network, NG), model neoliberalismo of the state (NW-model). The first two concepts are based on the limited role of the state in the regulation of education, see universities as active subjects of market relations. The NPM model considers education as a service sector, and students as consumers of these services, for which universities compete sharply. At the same time, research in universities is recognized as an important tool to improve their competitiveness. The model of “network management” (NG) assumes active participation of universities in network partnerships between educational institutions, scientific clusters, business organizations. “Network University” is based on interdisciplinary cooperation, network training programs, virtual learning environments, distance learning, academic mobility, matrix management structures. With regard to the concept of the neoveberian state (NW model), it assigns a key role to the state in the management of education and in the provision of educational services. This is its main difference from the first two models, focusing on the weakening of the state reform of education and the autonomy of universities. Education in the NW model is considered as a public service for the citizens of their country, and not as a market product [13,14].

What are the prospects for the implementation of The University 3.0 concept in Russia? The current system of higher education in our country is still focused on the industrial culture of the second half of the XX century and does not meet the needs of innovation and technological breakthrough. In Russia, the approach has taken root, according to which the state determines the competence and development prospects for universities. This tradition condemns Russian universities to lag behind the world leaders in the field of higher education, who, as already noted, themselves have long been “trendsetters” in the field of competence and the formation of market trends. In the Strategy of innovative development of the Russian Federation for the period up to 2020, the priority in education is the focus “on the development of the research and development sector in universities, the deepening of cooperation of universities with advanced companies of the real sector of the economy and scientific organizations... the development of a network organization of educational and research programs” (section IV.5), but at the same time, the Russian innovation system is characterized as “oriented towards imitation, rather than the creation of radical changes and new technologies” (section I. 2). In Russia, the share of industries that belong to the knowledge economy in GDP is 15%, while in the developed countries of Europe – 35%, in the US – 45% [15].

A significant part of Russian universities corresponds to the University model 1.0, i.e. they fulfill only an educational mission. In other universities, research and

development are to some extent integrated into the educational process (University 2.0). There are practically no 3.0 universities engaged in the commercialization of knowledge in Russia, with very few exceptions. In 2016, the St. Petersburg national research University of information technologies, mechanics and optics (ITMO) and RVC JSC monitored the effectiveness of innovative activities of 40 leading Russian universities participating in the 5-100 projects in the development program of the NRU, including Federal universities. It turned out that the elite Russian universities do not actually conduct innovation and entrepreneurship, which is mandatory for the University 3.0. In 19 out of 40 surveyed universities, small innovative enterprises (MIP) do not provide income at all, and in the rest the annual income from 1 MIP is on average 386 thousand rubles, mainly due to contracts with the University itself. There are less than 10 MIP in 24 leading Russian universities. More than half of universities (24 out of 40) have no income from intellectual property management. Most of the leading Russian universities work on the principle of “patents are, there is no income”, and patents are mainly Russian; 28 elite universities do not have international patents at all, and 11 have between 1 and 3 such patents. Tomsk Polytechnic University is the leader in this field, which received 11 international patents, but its average annual income from intellectual property management does not exceed 800 thousand rubles [16,17].

In the state priority project “Universities as centers of spaces of innovation”, which was approved on 25 October 2016 by the Presidium of the Presidential Council of the Russian Federation for strategic development and priority projects, was scheduled to ensure sustained global competitiveness in 2018. At least 5, and in 2025 – at least 10 of the leading Russian universities; to create in the subjects of the Russian Federation in 2018. No less than 55 in 2025. At least 100 University-based centers of innovation, technological and social development of the regions.

How much progress has been made in this direction? According to the results of the international rankings of 2018, which take into account the participation in innovation, the positions of Russian universities have improved. Thus, according to the rating of RUR-2018, which was attended by 783 universities from 74 countries, it included 70 Russian universities (in 2010 there were only 11), and 10 of our universities are included in its TOP 500. The best performance was demonstrated by MSU, which took 153 place and got into the so-called “Golden League”, as well as MEPhI (224 place) and Tomsk state University (240 place). The TOP 1000 of the prestigious the (Times Higher Education) rating includes 18 Russian universities, the international QS – 24 rating, the final part of the Shanghai rating – 12, and almost all the ratings showed that the best of the Russian universities are MSU, MEPhI, Tomsk state University, MIPT, MAI, Tomsk state Polytechnic University, Novosibirsk state University, Bauman state technical University, RUDN, Russian state University of oil and gas, ITMO University [18]. It is they who are currently making active efforts to

become "third generation" universities, or NTI Universities.

Within the framework of the national technology initiative program, the creation of University territories of advanced development is recognized as a key area of training for the markets of the future. The program provides that the University of NTI should carry out fundamental and applied research on the subjects of NTI; to form an innovative infrastructure (technology transfer centers, business incubators, technology parks, etc.); to train professionals for the markets of NTI, i.e. to work with talents – drivers of future development; to carry out effective management of intellectual property, commercialization of developments and generation of new businesses in the STI markets. NTI University is intended to become the center of ecosystems, focusing on them the resources of development programs on the principle of "from mycelium to tree". In this sense, as the "roots" are considered education, competence, circles, applicants. Kroma unites such elements as industry cooperation, partnerships, and entrepreneurial culture. The "trunk" is the University itself, providing interactive interaction between the market and talents, stimulating creativity at the personal and organizational levels. The development of networks involves the allocation of competitive laboratories for research, faculties and departments for advanced training. The creation of hubs means building a chain of intellectual property values from research, obtaining patents and licenses to the production of a finished innovative product on the basis of industry and business cooperation [19-23].

However, the creation of the NTI University in Russia requires overcoming many barriers, the main of which are: 1) the lack of active demand for innovations from the Russian market, as well as an effective mechanism of interaction between consumers and suppliers of innovations, which leads to the export of intellectual property from the country, the leakage of scientists, highly qualified specialists, capital against the; 2) an acute shortage of scientists and specialists capable of implementing complex interdisciplinary projects, to act as market leaders in the field of competencies, integrators of knowledge-intensive processes; 3) lack of coordination of the action plan for the implementation of the program of the National technological initiative ("NTI road maps"), which prevents the formation of a holistic picture of technological development; 4) the lack of opportunities in the country to meet the demand for fundamentally new areas of knowledge and professions, which also provokes the outflow of gifted youth from the country; 5) non-compliance of the Russian legal framework with the objectives of STI: in accordance with the Law on education, an educational organization in our country has the legal status of a non-profit organization, which is not allowed to engage in entrepreneurial activity, but only allowed to carry out income-generating activities; 6) insufficiently developed legislation on intellectual property; 7) high educational load on teachers of traditional Russian higher education institution, initially "landing" it to level 1.0 and being a

serious obstacle for active scientific and innovative work and for participation in cooperation with business entities.

Particular attention should be paid to the legal problems of intellectual property. It seems that the lack of legal certainty about intellectual property rights is one of the main obstacles to the innovation activity of Russian universities and their commercialization of knowledge and technology. This is also the main brake on innovation in the country as a whole, the creation of corporate venture funds and venture companies. After all, for both domestic and foreign investors, when making decisions on investing in research and development or in the purchase of new technology, it is important to clearly understand in what order and in what proportion the rewards from the sale of intellectual property will be distributed. Otherwise, the interest of private business in commercialization of inventions is sharply reduced. It is impossible to provide an effective mechanism of interaction of business with the sphere of inventions and discoveries without the settlement of questions about the legal nature of intellectual property and its owner as a subject of legal relations, which means that there will not be a single "innovation chain". Currently, about 70% of Russian organizations in the field of science and the majority of universities are state-owned, so support for research and development is carried out mainly from the budget. About 90% of all intellectual property objects existing in Russia are created at the expense of budgetary funds. For a technological breakthrough and modernization in Russia, it is necessary to clearly define at the legislative level how the state will dispose of intellectual property that it can own, and how this property will be used in the economy. Equally important is legal certainty about mixed R & D funding, which involves the allocation of funds from several different sources. This type of funding for research and development remains the most common in our country. Thus, for the effective use of the results of intellectual activity is not enough to provide legal protection of intellectual property, requires a serious legal study of the mechanisms of its commercialization. There is a need for full clarity about the rights to intellectual property created at the expense of public funds, as well as the transfer of the rights to dispose of its objects from the state to the local level of management. To this end, intellectual property rights should first be assigned to developer organizations (including higher education institutions) and, in addition, the transfer of these rights from academic organizations and universities to business representatives should be encouraged for the purpose of commercialization. At the same time, it is useful to take advantage of positive foreign experience in the organization of the research process – for example, the practice of agreements on joint research between public and commercial organizations – universities, scientific, laboratories, private companies [24,25].

Thus, the inclusion of Russia in the new technological revolution urgently requires the modernization of the activities of leading Russian universities in

accordance with the concept of University 3.0, the Russian model of which is the University of National technological initiative. Ensuring the global technological competitiveness of the Russian economy is impossible without deep institutional reforms aimed at transforming leading universities into centers of entrepreneurial ecosystems, leaders in the formation of technological and market competencies, and drivers of future markets.

There is no conflict of interests.

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