

PATENT STRATEGY AS A KEY COMPONENT OF INNOVATION DEVELOPMENT IN UNIVERSITIES

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Abstract. Category: conceptual article. The problem considered in the article is the failure of most Russian universities to develop intellectual property (IP) management strategies capable of meeting the challenges of the market. The importance that is currently attached to this issue concerns the national strategy for the scientific and technological development of the Russian Federation – in particular, as enshrined in the national project “Nauka” (Science). The goal of the work determined by the current situation is thus to formulate the structure of the strategic goals of universities in the field of intellectual property, as well as to identify and systematise typical strategies for their accomplishment.

To achieve this goal, the following tasks were carried out within the framework of the study: 1) an analysis of Russian and foreign publications in order to systematise methodological approaches to the formation of the university’s patent strategy; 2) a systematisation of key performance indicators used in assessing the activities of universities in their reporting documents and ratings; 3) a collation of approaches to the formation of patent strategies of Russian universities, based on a comparative analysis of university-wide missions and goals, as well as general aims and strategies for managing intellectual property.

The solutions to these problems formed the basis for a systematisation of approaches to the formation of patent strategies in Russian and foreign practice. It is proposed that patent strategy be considered as a vector of the development of university IP across such coordinates as the competitive behaviour model, as well as the volume, geographical distribution and structure of the patent portfolio with respect to target audiences (key consumers) and strategic partnerships.

The conducted studies and generalisations, which will be used to support the innovation activity of UrFU, may also be useful to other universities of the Russian Federation for improving systems of innovation and intellectual property management.

Keywords: University, patent strategy, intellectual property, commercialisation

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Introduction

One of the most important institutions for ensuring the implementation of research and development results in world practice is the patent system, which ensures the consolidation of intellectual rights to the results of research, design and project works and provides the legal basis for their commercialisation. According to the strategy of scientific and technological development of the Russian Federation¹, indicators of patent activity also play a very significant role. Thus, in particular, within the framework of the national project “Nauka”, the first three evaluation parameters in the selection of applicants for the creation of scientific and educational centres are associated

with patent activity. In other words, since comprising one of the key components of the national innovation system, universities should have a strategic vision of the development prospects of patent activity due to its strategic importance in the scientific and technological development of the Russian Federation.

In recent years, Russian universities have achieved some success in this area. First of all, the results regarding the formation of the universities policy in the field of intellectual property should be noted. The first official intellectual property policy adopted by a university in the Russian Federation was in 2012 at the Ural Federal University²; subsequently, other Russian universities implemented this practice. A significant contribution was made by the project of the World Intellectual Property Organisation (WIPO) to

¹ STRATEGY OF SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT OF THE RUSSIAN FEDERATION Approved by Decree of the President of the Russian Federation of December 1, 2016, № 642.

² Intellectual Property Policy of the Ural Federal University, available at: <http://inno.urfu.ru/admin/ckfinder/userfiles/files/doc20121120170643.pdf> (accessed: 05.08.2019).

develop a model intellectual property policy for universities and research institutions. The corresponding document, approved by the Ministry of Science and Higher Education of the Russian Federation in July 2018, is currently being introduced into the practice of Russian universities³. The adoption of a university policy in the field of intellectual property defines and formalises the basic principles of intellectual property management, including models for the separation of exclusive rights and distribution of income from their use, which contributes to the development of motivational schemes and, therefore, patent activity of universities. These days, an indication of an effective motivation for creativity is the filing several dozen or even hundreds of patent applications per year, which is no longer an exception for Russian universities.

Meanwhile, there is a clear imbalance between the number of patents generated and the indicators characterising the income derived from the use of inventions. Although patent portfolios of leading Russian universities reach several hundred documents, the percentage of inventions actually used and financial indicators pertaining to their effective commercialisation are significantly lower than in the world practice⁴. It should be noted that the current situation reflects the general state of the IP market in Russia. The licensed market for patented technologies is very poorly developed due to the structural features of the Russian economy, the low receptiveness of Russian companies to innovation and the prevailing form of technology transfer in Russian practice, which occurs mainly in the form of R&D [2]. Given this circumstance, the state is making efforts to stimulate the development of the licensed market, in particular, through various forms of financing university research and development with the obligatory involvement of an industrial partner. In particular, following the completion of work under the Federal Target Programmes, as well as projects under the Decree of the Government of the Russian Federation No. 218, intellectual property achieved via state support is licensed to an industrial partner. In our opinion, despite the somewhat artificial nature of such organisational models, the licensing of research results to an industrial partner is an important and effective tool for stimulating practice – and, no less importantly, developing a technology licensing market culture.

³ Intellectual Property Policy for Universities and Research Institutions // M.MINOBRNAUKI.GOV.RU, available at: Internet site. https://m.minobrnauki.gov.ru/common/upload/library/2018/10/Politika_v_oblasti_IS_s_VOIS.pdf (accessed: 05.08.2019).

⁴ AUTM Licensing Activity Survey: FY 2017, available at: https://autm.net/AUTM/media/SurveyReportsPDF/AUTM_2017_US_Licensing_Survey_no_appendix.pdf (accessed: 05.08.2019).

However, these are only the first steps in the development of a technology licensing market, which will not be sufficient to solve the problem of the financial effectiveness of patent activities of universities in the near future. In reality, in this situation, universities tend to operate intuitively and in most cases without any system, given the conceptual need to patent innovative developments, and, counting on a potential commercial result, register the rights to their developments. At the same time, at the current stage of development of the Russian economy, intuitive actions concerning the market of intellectual property are no longer sufficient. In this context, the development of a strategic vision of the university development prospects in the field of intellectual property becomes an imperative.

With some rare exceptions, an analysis of open sources⁵ failed to reveal the presence of documented patent strategies in Russian organisations. Moreover, this common practice for both universities and industry is probably due to the confidential nature of these documents. However, our interviews indicate that very few organisations have developed a patent strategy across both university and business environments. It is evident that Russian organisations lack a formalised strategic vision of approaches to managing the most important resource for innovative development. Thus, there is reason to believe that the attention paid to this issue by universities, research institutions and industrial enterprises does not correspond to the significance of the legal protection tasks and commercialisation of the results of intellectual activity formulated in the Scientific and Technological Development Strategy of the Russian Federation.

It should also be noted that patents are only part of a university's intellectual property portfolio, along with copyright, know-how and others. Due to the inherently public nature of patent information and the key role of patent protection in the innovative technological field of a university's activities aimed at implementing its "third mission" [2.25], this component of the institution of intellectual property is among the more interesting areas for research. In addition, a practical patent strategy generally contains an analysis of alternative methods of legal protection, which are either classified or, conversely, based on the publication of relevant information. In this context, the primary emphasis of the present work will be placed on patent strategy, but not excluding other ways of legal protection of the results of intellectual activity.

The above considerations determined the goal of the work: to formulate the structure of the strategic

⁵ Available at: http://www.vega.su/innovations/Patent_strategia.pdf (accessed: 05.08.2019).

goals of universities in the field of intellectual property, as well as to identify and systematise typical strategies for their achievement.

Research rationale

The hypothesis of our study consists in the fact that the component associated with intellectual property management strategy is presented in the development strategies of leading Russian universities at a level that does not correspond to the challenges of the market and the importance attached to this issue in the strategy of scientific and technological development of the Russian Federation and, in particular, the national project “Nauka”. To test this hypothesis, as well as to find ways to solve the problem associated with it, the following tasks were set in the study.

1. To analyse Russian and foreign publications in order to systematise approaches to the formation of the university’s patent strategy in terms of external factors, including the nature of the institution of intellectual property and trends in the development of the market for intellectual property rights.

2. To identify and systematise formalised and non-formalised corporate patent strategies of Russian universities based on an analysis of the wordings of university-wide missions and goals, as well as goals and strategies for managing intellectual property. Universities included in the association of leading universities of the Russian Federation were taken as a sample.

3. To analyse indirect indicators of university strategies in the field of intellectual property, including key performance indicators used in assessing the activities of universities in university reporting documents and ratings.

Publication Analysis

The framework within which organisations form their patent strategies is generally defined by corporate strategies [3]. At the same time, in a knowledge-based economy, innovation forms the main link between a company’s business strategy and patent strategy. Indeed, it is not so much inventive activity itself that is stimulated by the patent system as the transfer of knowledge gained in the scientific field to industry [4]. Moreover, the monopoly on technical solutions makes private investment in R&D and the commercialisation of innovative technologies more attractive.

A wide range of works by domestic and foreign authors sets out to study the functional role of the patent portfolio as a key success factor in a modern economy. In the study [5], the relationship of the functional

role of intellectual property and business needs is considered within the paradigm of Maslow’s hierarchical pyramid. The two lower, basic levels of the pyramid include ensuring such stakeholder needs as minimising the risks of patent conflicts (patent purity of products), as well as ensuring the competitiveness of products and the business as a whole on the basis of a legal monopoly provided with exclusive rights. Neglecting these levels leads, in the figurative expression of the author, to the “dismissal of the manager”. The following three levels include such factors and effects as: (1) a significant impact on the transfer of new technologies from the scientific environment to industry; (2) the acceleration of research and development processes, as well as the creation of new products; and (3) the fullness of realising the benefits from the use of new technology. Effective intellectual property management at these levels provides effects of a higher order, exerting an indirect, but very significant impact on the achievement of corporate goals. A similar approach to the structuring of intellectual property management strategies was proposed by N. N. Karpova [6]

The author of the work [7], which considers the impact of patent strategy on innovation that provides competitive advantages, notes such effects as: creating “patent thickets” around key competitor patents, blocking similar developments of a competitor, as well as technology licensing. The presence of a patent portfolio is also a prerequisite for negotiations with investors, which operate on the principle that if no patent is possible, then there is no need to invest. Moreover, the author emphasises that, besides competition, the growth in the number of applications for inventions is directly attributable to this growth, since the accelerated development of the technology market plunges the world of ideas into the rapidly burgeoning patent arms race, within which a defensive patenting strategy plays an increasingly important role. In other words, the main reason why companies patent more inventions is because their competitors are patenting more inventions.

Regarding the value of the patent portfolio as a source of direct income, for some industries, such as biopharmaceuticals, software, semiconductors and telecommunications, technology licensing is becoming a “way of life” according to [7]. According to The Economist magazine [9], worldwide technology licensing accounts for an estimated \$ 100 billion in revenue. Moreover, as the author [7] notes, an active licensing strategy is characteristic not only for small technology-oriented enterprises, but also for large companies, such as, in particular, Procter & Gamble, DuPont, Boeing, Hoechst, IBM, Texas Instruments, AT&T, and Phillips Petroleum, which

also see licensing revenue as a significant part of technology investment revenue. However, it should be noted, that in the Russian market such a strategy is currently not dominant⁶ [15].

In the literature, there is an increasing focus on the information function of patents as an important tool for representing the company's value in public space, e.g. [5, 6]. Automated systems for searching and analysing patent documents, of which there are currently about 120 million⁷ worldwide, are used to analyse the patent and technological strategies of key market players, as well as to keep investors informed about their own key competencies. The Intellectual Property Owners Association compiles an annual TOP-300 rating of copyright owners⁸ [17]. According to the results of 2017, the top three places in the ranking are occupied by IBM (8996 patents), Samsung (5810 patents) and Intel (3726 patents), showing an eight percent increase in the volume of the patent portfolio compared to 2016.

Analytical systems such as Questel-Irbit⁹, Clarivate Analytics¹⁰, Patent Lens¹¹ support an express analysis of the structure of the patent portfolio, including such parameters as

- key products, nodes and basic technologies;
- share of patents supported;
- the intensity and dynamics of patenting;
- availability of patents related to technical standards (SEP – standard essential patent);
- geography of patenting;
- number of patents pending litigation;
- licensing policy;
- partnerships in licensing and co-patenting formats.

A generalisation of the approaches to describing corporate patent profiles used in analytical systems provides grounds for considering the structure of the patent portfolio as a certain coordinate system in which the company's patent strategy vector is formed.

Some authors [10] rightly note a terminological ambiguity concerning the concept of patent strategy. Considering in his work a number of approaches to the definition of the patent strategy concept, R. B. Tokarev believes that the authors tend to confuse

the criteria and features of patents, patent portfolios and patent management strategies [10]. For example, when talking about patent strategies many authors typically mention so-called offensive and defensive patent strategies. In [11], the author considers such patent strategies as simple majority, patent “flood” and patent blocking strategies, while in [12], approaches described for managing intellectual resources include strategies for defending against competitors, attacking competitors, licensing, creating a company's contemporary image, forming authorised share capital and optimising financial and economic activities.

Agreeing with Tokarev [10], we note that in many studies, either a model of competitive behaviour (offensive or defensive), a patenting strategy (for example, blocking patents), or specific parameters of a patent strategy, including volume and patent portfolio structure, geography of patenting and others, are considered as patent strategies. In our opinion, the reason for this is that many such interpretations consist in different “sections” or views on the patent strategy, which in general either determine all the above-noted factors and conditions, or are connected to them. As a result, the definition of a patent strategy due to the multiplicity of its cross-links with other functional strategies of the organisation, including marketing, technological, product and others, inevitably leads to a facet classification of features.

A number of a well-known works [13–19] are devoted to the analysis of approaches to a university's intellectual property portfolio management. Thus, the authors of [13] note that universities are universally considered as the main source of applied knowledge, the majority of which is transferred to the industrial sector of the economy through university technology transfer centres. According to an annual review carried out in 2017 by AUTM¹² [5], American universities entered into more than 6,000 licensing agreements.

Meanwhile, despite the fact that university technology transfer centres using standard commercialisation strategies are making notable successes in such areas as biomedicine, chemistry and electronics, according to the authors of [15], different approaches are required in a number of other industries, usually focused on direct income through legal mechanisms for licensing intellectual property and control of key resources. As a very promising alternative, the authors consider more flexible approaches to the commercialisation of intellectual property, based on the concept of open innovation.

⁶ Annual Report of ROSPATENT 2018, available at: https://rupto.ru/content/uploadfiles/otchet_2018_ru.pdf (accessed: 05.08.2019).

⁷ World Intellectual Property Organization: <https://www.wipo.int/portal/en/index.htm>

⁸ Intellectual Property Owners Association (IPO), available at: https://www.ipo.org/wp-content/uploads/2018/06/2017_Top-300-Patent-Owners.pdf (accessed: 05.08.2019).

⁹ Questel Orbit, available at: <https://www.questel.com/#> (accessed: 05.08.2019).

¹⁰ Clarivate Analytics, available at: <https://clarivate.com> (accessed: 05.08.2019).

¹¹ Available at: <https://www.lens.org/> (accessed: 05.08.2019).

¹² AUTM Licensing Activity Survey: FY 2017, available at: https://autm.net/AUTM/media/SurveyReportsPDF/AUTM_2017_US_Licensing_Survey_no_appendix.pdf (accessed: 05.08.2019).

The authors of [16] note that leading universities in developing countries have been characterised by a strategy to increase patent portfolio volumes in recent years. At the same time, despite the undoubted successes of leading technology transfer centres, there is still a significant gap between the number of patented inventions and technologies that have reached market [17]; moreover, licensing income makes up only a small fraction of the total research budget of universities. As the main barrier, the authors note a lack of qualified personnel in the universities' transfer centres, the insufficient existing level of remuneration for their work in budgetary organisations, as well as the contradiction associated with the self-sufficient policy of technology transfer centres, which often diverts resources for projects with higher profitability rather than focusing on the commercialisation of university developments.

The correlation between the university's policy in the field of intellectual property and the method of commercialising technology, including the creation of a start-up and licensing, revealed in [18], is very interesting. Distinguishing between patents "owned by the university" and patents "created at the university", the authors showed that the rights to inventions created at universities are typically secured for small innovative enterprises when creating start-ups, while licensing to industrial enterprises is more characteristic of rights to patents owned by universities. This conclusion was based on an analysis of a sample of more than 800 patents created at universities from 22 countries.

As one of the strategic alternatives to the commercialisation of university technologies, international alliances between universities were considered in [19]. As the advantages of such alliances, the author notes such factors as the opportunity to develop key competencies and a higher level of trust.

In the study [20], a comparative analysis of approaches to technology transfer in developed economies and developing countries was carried out on the example of the republics of Belarus, Kazakhstan and Azerbaijan. Based on statistical processing of the results of numerous interviews, the authors confirm the hypothesis that, unlike the situation in developed countries, university-based technology transfer centres in developing economies cannot yet claim to be a significant channel for transferring knowledge.

Analysing the activity of technology transfer centres of 178 European universities, the authors of [21] identified three typical university knowledge transfer strategies: (1) an income generation strategy, (2) a strategy for supporting researchers; and (3) a local economic development strategy.

The revenue generation strategy focuses on securing patent rights for the university and licensing

technology to industrial enterprises. According to [21], such a strategy is characteristic of large, prestigious universities and several large successful licensed transactions that provide the main income.

The so-called "Service-to-Faculty Strategy" is aimed at the long-term development of research potential, including not only support and development of staff qualifications, but also the development of social and professional networks. In this model, technology transfer centres help researchers to increase the value of their developments by attracting leading scientists to commercial research projects based on collaboration with industry. Here, the main focus is on increasing the number of patent applications, seeking financial support for research and developing collaborations, as well as supporting network activity.

The strategy of "local economic development" is aimed at involving researchers and students in the creation of new companies, as well as developing technologies that are in the interests of regional companies. As part of such a strategy, technology transfer centres focus on the development of business incubators, acceleration programmes, seed stocks, as well as research laboratories with financial support from regional enterprises. The measure of the effectiveness of such a strategy is the number of start-ups, as well as the number of new jobs.

It should also be noted that technology commercialisation strategies are constantly evolving. In this regard, the work of Tom Hockaday, Head of Oxford University Innovation (previously Isis Innovation) [22], is of particular interest. This example is primarily of interest for Russian practice due to this transfer centre being most often considered as an example in the works of many Russian experts in the field of technology commercialisation [23]; accordingly, the first steps in the formation of technology transfer systems in Russia in the late 1990s and early 2000s took the experience of this transfer centre into account.

Summarising the experience of Isis Innovation from 2000 to 2016, the author of [22] identifies several phases of the development of university technology transfer forms in the UK and notes that the first phases of the development of technology transfer centres, taking place from the late 1980s until approximately 2010, were primarily related to the commercial interest of universities and their transfer centres. Russian experts in this field will probably remember the key points of reports on the work of British and American technology transfer centres, which were based on vivid indicators of revenue growth from license sales and the cost of university shares in start-ups. According to the author, research links with industry began to

acquire more and more value for British universities during the subsequent period, with the existing and potential patent portfolio of universities becoming a very attractive incentive (“carrot”) for attracting money from enterprises for research. Moreover, following reviews of interaction models, foreign companies are beginning to prefer long-term scientific collaborations and partnerships with universities, relying on intellectual property created under research contracts instead of licensing the results of research that has already been carried out.

This trend also affected the functionality of British technology transfer centres, which, according to the author [24], began to pay more attention to the support of researchers in preparing applications for research funding. Among other reasons, the author identifies both increased attention to negotiations on intellectual property issues at the conclusion of research contracts and an increase in the interest of state scientific foundations in applied research results.

Similar approaches and trends are also characteristic of the development of technology commercialisation systems and intellectual property management in Russian universities, see, for example, [1, 14, 23, 24]. One of the distinguishing features of university technology transfer systems in the Russian Federation is the emphasis on infrastructural support for project teams and start-ups, also seen as a part of acceleration programmes associated with the underdevelopment of

the Russian technology licensing market.

Summarising the foregoing, we systematised the functional roles of patents from the point of view of stakeholders, dividing them into a number of categories including the following goals and tasks, (Table 1):

- Competitive goals and objectives
- Technology transfer support tasks
- Financial goals
- Informational goals

Moreover, the presented analysis allows us to offer an interpretation of the term “patent strategy” and its relationship with the more familiar term “patent policy” in the context of Russian university practice, also through the initiative of WIPO¹³. While patent policy defines the goals, basic priorities and principles of intellectual property management [2], patent strategy can be defined *as the development vector of the university in the field of intellectual property across such coordinates as: the competitive behaviour model; the volume, geography and structure of the patent portfolio; target audiences (key consumers); target markets; strategic partnerships* (see, for example, [10]).

Fundamental differences between patent strategies applicable to industrial enterprises and universities should also be noted. These are primarily due

¹³ Intellectual Property Policy for Universities and Research Institutions // M.MINOBRNAUKI.GOV.RU, available at: https://m.minobrnauki.gov.ru/common/upload/library/2018/10/Politika_v_oblasti_IS_s_VOIS.pdf (accessed: 05.08.2019).

Table 1

Functional roles of patents

Role-based functions of patents as factors determining business interest	Source
<i>Competitive Tasks</i>	
Minimising the risks of patent conflicts	[5–7]
Legal support of product and business competitiveness	[5, 7, 12]
Creating “thickets” around competitors’ key patents	[5, 7, 10, 11]
Blocking similar competitor developments	[5, 7, 10, 11]
<i>Transfer support</i>	
Legal support for the process of technology transfer from science to industry	[13–16, 18, 21, 22]
The completeness of benefits from the use of new technologies	[14–16, 18, 21, 22]
<i>Patents as a financial asset</i>	
Availability of patents as a necessary condition in negotiations with an investor	[7]
Additional or core revenue from licensing patented technologies	[7, 8]
<i>Informational goals</i>	
Patents as a source of information on technological strategy*	[2, 3]
Patents as an indicator of the level of competence of companies and universities	[12, 21, 22]

* World Intellectual Property Organization, available at: <https://www.wipo.int/portal/en/index.html> (accessed: 05.08.2019).

to the difference in corporate missions, the goals and mechanisms for achieving them, as well as in the strategies for commercialising innovations and key products thereof. Thus, in particular, the key goals of enterprise are to increase profits from the sale of products and the value of corporate assets, while the goals of universities are primarily focused on the formation of highly qualified personnel, the creation and transfer of the results of fundamental and applied research, as well as support for regional economic development (the third university mission). In other words, a significant part of the activities of universities is focused on the transfer of knowledge (personnel and new technologies), which is to be commercialised in the future based on the realisation of their potential in the business environment. At the same time, the more indirect economic effect of the innovative activities of universities is manifested in the development of the economy as a whole through the activities of industrial enterprises.

From the point of view of advancing commercial goals, intellectual property rights for business can be seen as a tool that provides competitive advantages in the product market, while for universities it is a means and a form of commercialising new knowledge in various forms, e.g. through licensing, R&D and the creation of start-ups. The target audiences of the commercialisation of intellectual property for industry and universities are also different: in the first case, they are consumers of final products, while for universities they are consumers of qualified personnel and formalised knowledge. As a result, partnerships with businesses, including industrial companies and small innovative enterprises, play a significant role in the university's patent strategy.

Overview of indicators for assessing the effectiveness of the Russian universities IP management

Analysis of the patent activity of universities lies in the sphere of interests of the Ministry of Education and Science of the Russian Federation, Rosstat, as well as a number of analytical centres, including Interfax (national university ranking) and the "Expert" Analytical Centre (rating index of the inventive activity of Russian universities). The grouped indicators used in the blocks "Legal protection of the results of intellectual activity (RIA)", "Commercialisation of RIA" are presented in Table 2.

The analysis showed that in all ratings there are quantitative indicators of patent activity of higher education institutions. Approximately 40% of the ratings take collaboration with commercial organisations

into account, as well as the number of licensing agreements. Three out of five ratings pay special attention to foreign patenting activity. Financial indicators of the use of intellectual property are evaluated in only one of the five ratings reviewed. Thus, the analysis of well-known university ratings confirms the thesis that the volume and structure of the patent portfolio are one of the main indicators of university patent activity.

As for indicators that directly or indirectly reflect the direct commercial results of universities, the performance on these indicators is still low. Indeed, on the basis of the sample studied by us, only a few universities receive income from the sale of licenses and very few promote their developments abroad (which indirectly indicates the expectation of an economic effect, given the differences in the costs of Russian and foreign patenting).

As an illustration and confirmation of the above thesis, Table 3 presents the data on the foreign patent activity of Russian universities for the TOP-10 of Russian universities according to the rating of the "Expert" analytical centre [26].

As follows from the analysis, only 6 out of 40 Russian members of the Association of Leading Universities are patenting and – presumably – promoting their developments. The situation is similar for the indicator "licensed activity of the university". Obviously, this situation does not meet the strategy of scientific and technological development of the Russian Federation and consequently requires a strategic approach to the formation of Russian universities' patent portfolios.

Thus, referring to the classification of the functional roles of intellectual property in Table 1, we can assume that for most of the Russian universities, the main patenting function consists in providing information about the core competencies of the university. It should also be emphasised that, to a certain extent, the informative function plays a competitive role, raising the university in rankings and providing attractiveness in the market of educational services and scientific products.

Goals in the field of intellectual property and the university mission: correlation of values

Further, we will try to show how the indicators for assessing the effectiveness of IP management considered above are related to the achievement of universities' corporate goals. Assuming that cause-effect relationships here are obvious, but are now more likely to be determined at the level of intuition, to solve this problem we will conduct a comparative analysis of the values supported by universities as strategic goals, missions and vision of development prospects, on the one hand, and opportunities, provided by the

Table 2

Patent performance indicators for Russian Universities

Patent performance indicators of Russian Universities	Ministry of Science and Higher Education of the Russian Federation*	Form No. 4 – NT**	Interfax (national university ranking)***	5–100	Analytical centre “Expert” **** [26]
<i>Legal protection of RIA</i>					
Number of patents, including					
General	+	+	+	+	+
Received in the reporting year	+		+		
Supported	+		+		
Foreign	+	+			+
Acting					+
Share of cited patents					+
The number of patents citing articles					+
In collaboration with universities and academies of sciences					+
In collaboration with companies				+	+
With students	+				
Number of applications, including	+		+		
With students	+				
Foreign		+	+		
<i>Commercialisation of RIA</i>					
Number of patents sold					+
Number of licenses	+				+
Payment of royalties		+			
The use of intellectual property in economic turnover		+			
Intellectual property financial performance		+			

* Report of the Ministry of Science and Higher Education of the Russian Federation on the composition of information on the results of the activities of scientific organisations performing research, development and technological work for civil purposes, submitted for monitoring and evaluation.

** Report of the Federal statistical observation on information on the use of intellectual property.

*** National University rating on entrepreneurial (innovative) potential of the University

**** (Rating “Index of inventive activity of Russian universities”).

Institute of Intellectual Property, on the other. Here, we are talking about the need for clear and formalised goal-setting by universities in the field of intellectual property in conjunction with general university aims. It should be noted that the importance of harmonising IP management indicators with the strategic goals of universities is demonstrated, among other things, by the recommendations proposed in the WIPO Model Intellectual Property Policy for Universities¹⁴.

¹⁴ Intellectual Property Policy for Universities and Research Institutions // M.MINOBRNAUKI.GOV.RU, available at: https://m.minobrnauki.gov.ru/common/upload/library/2018/10/Politika_v_oblasti_IS_s_VOIS.pdf (accessed: 05.08.2019).

In order to systematise development goals for innovative activities of universities, we analysed 46 development programmes of the Association of Leading Universities¹⁵, which showed that despite the variety of formulations, some of the most typical emphasis of formulations can be highlighted as presented in Table 4.

Summarising the results of the analysis, we can say that the missions formulated by the considered universities are largely similar. At the same time, federal universities more often emphasise the development of

¹⁵ Association of leading universities // ALU.SPBU.RU, available at: <http://alu.spbu.ru/ob-assotsiatsii/about> (accessed: 05.08.2019).

Table 3

Foreign patent activity of Russian universities. The table shows data on foreign patents and applications filed by Russian universities in 5 years

University	Near Abroad		Far abroad		
	EA applications	EA Patents	PCT Applications	National foreign applications	National overseas patents
Moscow State University (MSU)			7	1	3 (KR, EP)
Moscow Aviation Institute (MAI)	1		2		2 (CA)
Moscow State Technical University (MSTU)	1	9			1 (US)
National University of Science and Technology (MISIS)	2		4	7 (KR, CN, DE, JP)	1 (JP)
Samara National Research University		3		8 (US, DE)	4 (US)
St. Petersburg State University (SPbSU)	15		1		1 (US)
Kazan Federal University	2	3	5		
Siberian Federal University (SFU)			1		
Novosibirsk State Technical University (NSTU)	3				
Moscow Institute of Physics and Technology (MIPT)				1 (US)	
Ural Federal University (UrFU)		2	1		

Table 4

Emphasis in the formulation of Russian university missions

Emphasis in the formulation of universities' missions	Frequency of formulation use	University types
The development of the university as a <i>modern educational, scientific, expert-analytical, innovative and cultural centre</i> , providing high-quality training of competitive specialists able to ensure sustainable development of the region.	15	Federal – 8 National Research University (NRU) – 7
<i>Personnel, scientific and innovative support for priority development directions</i> based on systemic modernisation of the multi-level professional education of the university, ensuring the integration of science, education and production.	13	Federal – 1 NRU – 12
Sustainable development of the university as a <i>world-class innovative research university</i> with deep integration and a developed infrastructure of scientific, educational and innovative activities, ensuring the quality, competitiveness and demand of graduates, educational programmes, research and development in the interests of priority sectors of the Russian economy.	12	NRU – 10
<i>University entry into the world elite of classical universities, comprehensive research and educational support of the Russian Federation innovative development state policy.</i>	SPbSU, MGIMO	
<i>Creation of a Russian university of the future</i> , based on the principle of the unity of scientific, educational, economic and social processes and serving the prosperity of the state and society.	Moscow State University named after M. V. Lomonosov	
<i>Promoting technological development and enhancing the competitive advantages of Russia</i> in priority areas of modernisation of the Russian Federation economy in the context of accelerating scientific and technological progress, and globalisation of the world economy.	NRU Information Technologies, Mechanics and Optics (NRU)	

the university as a modern educational, scientific, expert-analytical, innovative and cultural centre in their mission formulations, while research universities focus on the support of personnel, as well as scientific and innovative development. Such universities as Moscow State University, MGIMO and St. Petersburg State University set ambitious goals for joining the world elite and creating a university of the future.

It should also be noted that the concept of the third university mission is clearly traceable in the considered formulations, i. e. in addition to the educational and research components, an emphasis is placed on assisting regional economic development. This was most clearly reflected in the goal setting of NRU ITMO – **Assisting technological development and strengthening the competitive advantages of Russia** in priority areas of modernisation of the Russian economy in the context of accelerating scientific and technological progress, as well as the globalisation of the world economy¹⁶.

It is precisely in this direction that the goal-setting in the field of intellectual property of leading Russian universities is focused. As a rule, it is presented in the policy in the intellectual property area. Thus, for example, Moscow State University named after M. V. Lomonosov in October 2011, in partnership with the LLC “Naukoyemkiye tekhnologii” announced the launch of the Lomonosov Moscow State University Intellectual Property Management Centre” (LLC “IPMC MSU”), whose main purpose is to develop the innovative activities of the scientific community of the Lomonosov Moscow State University through research, provision of legal protection and practical application (implementation) of the competitive results of intellectual activity¹⁷.

In terms of the main goals at which intellectual property management is aimed, St. Petersburg State University identifies a solution to the problem of legal protection of intellectual property and technology transfer, creating favourable conditions under which scientific knowledge is transferred from the research community of St. Petersburg State University through legal protection and technology transfer to start-ups, starting to work for the benefit of the whole of society and bringing practical benefits, ensuring maximum involvement of the educational process in technological development¹⁸.

¹⁶ The development program of NRU ITMO for 2009–2018 // NIU. ITMO.RU, available at: http://niu.itmo.ruru/page/13/o_programme.htm (accessed: 05.08.2019).

¹⁷ Management of innovation policy and international scientific relations // MSU.RU, available at: <https://www.msu.ru/info/struct/departments/uipl.html#1.2> (accessed: 05.08.2019).

¹⁸ Intellectual property management of St. Petersburg State University // UNIPAT.SPB.U.RU, available at: <http://unipat.spbu.ru/> (accessed: 05.08.2019).

At Kazan Federal University, the goal of IP management is to create conditions for the protection of the intellectual property and copyright of researchers and developers as a way for KFU research teams to enter the global market for high-tech products¹⁹. At the Ural Federal University, intellectual property policy is designed to ensure the most efficient use of the results of intellectual activity created at the university in the interests of the university, its employees, students, graduate students and society as a whole²⁰. The activity of the university’s innovation infrastructure is aimed at solving these problems [1].

Thus, a generalisation of the results of information analysis presented on the websites of 46 members of the Association of Leading Universities indicates that the main emphasis of university patent policies is focused on creating conditions for the efficient transfer of university technology and promoting the region’s economic growth.

It should also be noted that, despite the lack of formalised patent strategies for Russian universities, the main indicators determining the development vector of the university in the field of intellectual property can be identified from an analysis of university missions, intellectual property policies, as well as indicators of patent-licensing activities. From the point of view of the classification of strategies for the commercialisation of university technologies that has developed in the world practice, these indicators are mainly aimed at the formation and presentation of key competencies in the information space and the provision of competitive advantages in the research and development market.

Summary of results and conclusions

Summarising the above, we can draw the following conclusions:

1. An organisation’s patent strategy is based on a corporate mission and strategy; here, the connecting link is an innovative strategy, which in relation to universities is often referred to in terms of a strategy for the commercialisation of technology (i. e. of the results of intellectual activity).

2. In addition to educational and research components, the majority of Russian universities emphasise the promotion of regional economic development in their mission statements, stressing a commitment to the concept of the university’s “third mission”.

¹⁹ Regulation on the management of scientific and research activities // KPFU.RU, available at: https://kpfu.ru/docs/F785916979/Polozhenie.ob.Upravlenie.nauchno_issledovatel'skoj.deyatelnosti.KFU.pdf (accessed: 05.08.2019).

²⁰ Intellectual Property Policy of the Ural Federal University, available at: <http://inno.urfu.ru/admin/ckfinder/userfiles/files/doc20121120170643.pdf> (accessed: 05.08.2019).

3. An analysis of numerous publications indicates that the strategic priorities for commercialising university technologies in world practice change over time. Researchers typically distinguish three main strategies, with a gradual shift of priorities from the first to the second and third:

- A strategy for obtaining direct revenue from licensing, which is more characteristic of the practice of foreign universities.

- Development strategy of R&D projects based on state grants and direct agreements with business.

- Supporting regional development based on acceleration programmes for innovative projects and the creation of start-ups based on university technologies.

The first of these strategies, which is successfully applied, as a rule, by prestigious universities, allows them to receive tangible commercial income from the use of intellectual property.

In the second technology commercialisation strategy, the university's basic intellectual property plays an informational role, raises the university's ranking according to selection criteria and provides competitive advantages over other universities.

Under the third strategy, the commercialisation of intellectual property is carried out at the stage of determining the right to obtain a patent, which the university then gives to a start-up in exchange for a share in the business.

4. Each of the above commercialisation strategies has patenting priorities. For example, if a university focuses on supporting innovative projects as part of acceleration programmes, then, as a rule, university participation in the company is implemented through a share in the authorised capital, while start-ups have exclusive rights to patents. High competition in the market for R&D projects makes it expedient to form voluminous patent portfolios demonstrating the key competencies of the university; here, the availability of funded international research projects, as well as cooperation with foreign universities, forms the basis for foreign patenting.

An analysis of IP management performance indicators in Russian universities showed that at present the main indicators determining patent activity are quantitative. So far, only a few indicators directly or indirectly reflect the commercial results of the activities of Russian universities and these show that the effectiveness of universities is very low.

5. A generalisation of the publication analysis, as well as the structure of patent profiles offered by analytical patent systems, provides the basis for a determination of patent strategy as the development vector of the university in the field of intellectual property across such coordinates as: the competitive behaviour

model; the volume, geography and structure of the patent portfolio; target audiences (key consumers); target markets; strategic partnerships.

6. It was not possible to identify formalised patent strategies carried out by Russian universities within the framework of the study. However, an analysis of university policies in the field of intellectual property along with patent performance indicators demonstrates that most Russian universities choose development strategies for R&D projects based on state grants and direct agreements with business as priority strategies for commercialising technologies, as well as supporting regional development for the basis of acceleration programmes for innovative projects and the creation of start-ups based on university technologies.

Consequently, from the point of view of global classification practice, patent strategies of the Russian universities are mainly aimed at the formation and presentation of key competencies in the information space and the provision of competitive advantages in the research and development market.

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