

THREATS TO THE HUMAN CAPACITY OF REGIONAL HIGHER EDUCATIONAL INSTITUTIONS

In recent years, the sphere of science and education in Russia has undergone substantial reform. However, the existing guidelines for the higher education evolution contradict the Strategy of Scientific and Technological Development of Russia. These contradictions concern the formation conditions for an integral system of sustainable reproduction and the personnel recruitment for scientific and technological development of the country. The change in the financing model and the shift to a two-tier higher education increase the likelihood of talented young people leaving for cities where branded universities are concentrated. The trend to reduce the enrollment due to federal budget allocations and the existing system of per capita financing for regional universities are threats of a permanent reduction in the academic staff number and a potential decrease in the education quality due to an increase in the teachers' hours. The transition to a two-tier model of training in higher education led to a change in the approach to assessing the scientific research productivity. The number of publications in the journals, which are indexed in the Web of Science and Scopus, has increased, but the patent activity of the leading higher education institutions has decreased many times. The ratio of the number of articles to the number of granted patents in the leading Russian universities is significantly higher than that of the leading foreign universities. This can be regarded as a "brain drain". Furthermore, this fact explains why the share of income from the use of intellectual results in the total income of the vast majority of Russian universities is close to zero. It is necessary to develop a strategy for the innovative development of regional universities. This strategy involves changing the system of financing of higher education and assessing the scientific activity productivity in order to stimulate the creation of breakthrough social and technological innovations. Further research can be devoted to identifying influence agents in the field of education and science and methods for assessing damage from their activities.

Keywords: strategy of scientific and technological development, higher education, modernization objectives, threats to human capital, per capita financing, research priorities, patent activity reduction, patent portfolio, intellectual activities income, stimulation of universities innovative development

Introduction

In December 2016, by the decree of the President of the Russian Federation V.V. Putin, the Strategy for Scientific and Technological Development of the Russian Federation¹ was approved. Its goal is to build a national innovation system. In the section "The role of science and technology in ensuring the sustainable future of the nation, in the development of Russia and determining its position in the world," it is stated that "the weak interaction of the research and development sector with the real sector of the economy, the openness of the innovation cycle lead to the fact that public investment in the human capital actually ensures the growth of competitiveness of other economies, as a result of which the possibilities of retaining the most effective scientists, engineers, entrepreneurs, creating breakthrough products, essentially are reduced in comparison with other countries, leading in innovations." Given this, at the first stage of the Strategy implementation (2017–2020), one of the tasks is the formation of an integral system of sustainable reproduction and the attraction of personnel for the scientific and technological development of the country.

The system of higher education is the strategic social institution that provides the training of future researchers for academic, university and branch science. The creation of an integrated system of sustainable personnel reproduction should be considered in the context of the created conditions for "expanded reproduction" of the "compressed" human experience carriers — of teachers of higher education institutions.

At the same time, the real practice testifies to the increase in the higher education teacher's labor intensity, which experts attribute to the growing shaft of formalized requirements for workers'

¹ O Strategii nauchno-tekhnologicheskogo razvitiya Rossiyskoy Federatsii. Ukaz Prezidenta Rossiyskoy Federatsii ot 1 dek. 2016 g. №642 [About the Strategy of Scientific and Technological Development of the Russian Federation. Decree of the President of the Russian Federation of 1 December. 2016 No. 642]. Prezident Rossiyskoy Federatsii [President of the Russian Federation]. Retrieved from: <http://www.kremlin.ru/acts/bank/41449> (date of access: June 20, 2017). (In Russ.)

activity [1, p. 129]. Regardless of the status of the institution in which teachers work, researchers identify the tendency to curtail academic freedoms, which are one of the most important values of the university institutional environment [2]. Limitation of academic freedoms and their substitution by a compulsion to follow formal rules [1, p. 136] are also manifested in the evaluation of the scientific activity productivity. As Yu.Yu. Tarasevich and T.S. Shinyaeva rightly note, today in Russia there is no clear state policy in assessing the scientific activity results. The indicators proposed in various reports orient the performers to produce indicators, rather than scientific results [3, p. 222]. In addition, the methods of labor rationing and accounting, developed and used in industry or in the public service, are being used in such a specific sphere to which the scientific activity belongs [4, p. 54].

The problem of curtailing academic freedoms is also discussed abroad. This process is based on the transfer of corporate management models to university life; reformulation of the very nature of education in the instrumental way, in business and economic categories; the transformation of students into “consumers of educational services”, the deterioration of pay and working conditions for scientists; as well as the increasingly unstable employment in the practical absence of organized resistance of trade unions and other bodies [5].

As S. Head notes, “the life of the British universities, including Oxford and Cambridge, is increasingly being encroached upon by the system of the state control that undermines that, what their international prestige is based on — the quality of education and scientific work. The instrument of this invasion was the administrative methods, mostly of American origin, which originated in business schools and companies engaged in management consulting” [6].

And thus, the forecast that D. Schuster and M. Finkelstein (J. Schuster and M. Finkelstein) give in their work with regard to the restructuring of scientific work looks logical [8, p. 340–341]. According to the forecast, the departments will become “client services”, whose employees (teachers) will “provide customers with knowledge” (that is, to teach); there will be a “corporatization” of academic life, in which the values of scientific activity will recede into the background, teachers will work under the strict guidance of managers, as in other professional fields, administrative supervision over scientific activity will increase, while in the scientific world its elite will separate, and at the same time, the numerous “academic proletariat”, the number of posts that presuppose the conclusion of a permanent contract will be reduced, and, accordingly, the rights of teachers and research activities freedom will be under even greater threat.

Russian higher education cannot be developed in the context of dubious world trends. Taking the foregoing into consideration, the author formulated a hypothesis: the existing guidelines for the development of higher education are contrary to the Strategy of Scientific and Technological Development of Russia² in the part that relates to the conditions for the formation of an integral system of sustainable reproduction and the recruitment of personnel for scientific and technological development of the country. The purpose of this study is the verification of this hypothesis.

Strategic guidelines for the modernization of higher education: the agenda of Volkov, Livanov, Fursenko

In 2007, the journal “Innovative Education and Economics” published an article by A. Volkov, D. Livanov and A. Fursenko “Higher Education: The Agenda 2008–2016”. The paper defines the modernization guidelines for the higher education [9]. “Horizons” in the reform of higher education are to achieve the following indicators.

1. The share of Russian universities in the world education market should grow to 10 %, which is at least \$ 5 billion in monetary terms.

2. The annual income of professors in the leading universities in Russia should be comparable to that of colleagues in highly developed countries (the average income of professors in Europe is 60–80 thousand dollars per year, in the USA — 80–120 thousand).

3. At least 25 % of the volume of financing for higher education should be provided by the real sector of the economy (targeted training of specialists, funding specific vocational education programs, endowment funds, etc.).

² O Strategii nauchno-tekhnologicheskogo razvitiya Rossiyskoy Federatsii. Ukaz Prezidenta Rossiyskoy Federatsii ot 1 dek. 2016 g. № 642 [About the Strategy of scientific and technological development of the Russian Federation. Decree of the President of the Russian Federation of 1 December. 2016 No. 642]. Prezident Rossiyskoy Federatsii [President of the Russian Federation]. Retrieved from: <http://www.kremlin.ru/acts/bank/41449> (date of access: June 20, 2017). (In Russ.)

4. The share of research and development practice in the revenue structure of leading universities should be at least 25 %.

To achieve these targets, we have justified the necessity of changing the model for financing higher education and moving to a two-tier higher education. In particular, it is noted that “the transition to per capita financing encourages mobility, but nevertheless, without special mobility support programs, especially winners of olympiads and creative competitions, it is not impossible to count on the fact that talented but poor school graduates will go to the most prestigious universities” [9, p. 11]. It is quite obvious that the main goal of implementing per capita financing was to ensure the outflow of talented young people from the regions to large cities where branded universities are concentrated.

In reference to the transition to a two-tier education, it is noted that “after the legislation on higher education levels enters into force, the master’s degree should be concentrated in the universities that actively realize real research or project activities and ensure high quality. According to our estimation, such universities are no more than 25 % of the total number of Russian universities” [9, p. 11–12].

It is obvious that the concentration of magistracy in major university centers makes it impossible for the graduate school to function in the vast majority of regional universities. In the strategic perspective, this should lead to the fact that the opportunities for personnel reproduction will be lost.

The guidelines formulated by A. Volkov, D. Livanov and A. Fursenko contradict the National Security Strategy of the Russian Federation³ in the part that concerns national security at the regional level: with the final implementation of the announced initiatives, the differentiation of the social and economic development of the regions will increase, the settlement system increase the disproportions, conditioned by the desire of the best graduates from regions to cities, in which branded universities are concentrated.

Per capita financing as a threat to retain the human resources potential of regional universities

Hypothesis 1. Financing higher education is based on a wrong estimate of the population aged 17 to 30 (including 30 years old), which leads to a decrease in the number of students due to the appropriations of the federal budget.

In accordance with the medium-term forecast of the development of higher education in the author’s work “Methodology and theory of innovative development of higher education in Russia” [10, p. 178], there was made the estimate of the population aged 17 to 30 and the corresponding number of students study at the expense of allocations of the federal budget in accordance with the norm established in Article 100 of the “Education in the Russian Federation” Act (800 students per 10 thousand of the population aged 17 to 30 years old). Thus, in 2014, 2,342,700 people were to be trained at the expense of the federal budget, in 2015—2,250.7 thousand people, in 2016—2,197.7 thousand people, in 2017—2099, 4 thousand people, in 2018—2000,4 thousand people. However, according to the Federal State Statistics Service, at the beginning of the 2014/15 academic year, at the expense of the federal budget, 1990.5 thousand people were enrolled. At the beginning of the 2015/16 academic year, 1859.9 thousand people were enrolled at the expense of the federal budget⁴. Thus, annually more than 300 thousand students are deprived of the opportunity to study at the expense of the federal budget appropriations.

The revealed trend allows us to formulate the following hypothesis. Hypothesis 2. Per capita financing ensures the preservation of the human resources potential of the leading universities. Regional universities will face the need to reduce the number of faculty staff.

The analysis of the financial support of regional universities shows that the main source of funding is income from educational activities, the share of which is from 80 to 90 % in the total income of the university. At the same time, the share of off-budget funds in these incomes is from 30 to 50 %. A detailed analysis of the specifics of financing for 2015 and 2016 is sufficient and carried out in the following author’s studies [10, 11]. It is interesting to change the financing in 2017, because it provides

³ О Стратегии национальной безопасности Российской Федерации. Указ Президента Российской Федерации от 31 дек. 2015 г. № 683 [On the National Security Strategy of the Russian Federation. Decree of the President of the Russian Federation of 31 December. 2015 No. 683]. (2015, December 31). Rossiyskaya gazeta [The Russian Newspaper]. Retrieved from: <https://rg.ru/2015/12/31/nac-bezopasnost-site-dok.html> (date of access: 03/20/2017). (In Russ.)

⁴ Rossiyskiy statisticheskiy ezhegodnik. 2016 [Russian Statistical Yearbook. 2016]. (2016). Stat. sb Rosstat [Rosstat Statistical Collection]. Moscow, 209. (In Russ.)

the basis for funding in the following years (in particular, by 2018 the average salary of the academic staff should reach 200 % of the average salary of the region).

The labor cost of the academic staff for 2017 is determined by the order of the Ministry of Education and Science of the Russian Federation of July 20, 2016⁵. The values of the correction factors, taking into account the average wage level in the region, are presented in the document approved on July 25, 2016⁶.

The salary standard for the first and second bachelor's groups (specialist's degree) was 37.01 thousand rubles, for the third value group — 44.41 thousand rubles; the wage rate for the first and second groups of the magistracy was 42.56 thousand rubles, for the third value group — 46.26 thousand rubles; the standard of remuneration for the first and second groups of postgraduate study (postgraduate studies in a military college) was 47.70 thousand rubles, for the third value group — 57.24 thousand rubles.

The principal change in funding for 2017 is that the standard remuneration of labor for academic staff is no longer the same for all value groups. However, this is true only for the third value group (the areas and specialties of training related to the study of the following branches of knowledge: nuclear power and technology, physical and technical sciences and technologies, weapons and weapons systems, aeronautical and space-rocket technology, aero navigation and exploitation of aviation and rocket and space technology, technology and technology of shipbuilding and water transport, nanotechnology and nanomaterials, fundamental medicine, physical culture and sports, art history, cultural studies and socio-cultural projects, theatrical arts and literary creativity, musical art, visual and applied arts, military administration).

In the standards of remuneration for the teaching staff for the first (specialties and areas of humanitarian and socio-economic orientation) and the second value group (most areas and specialties of technical and technological orientation), there is no differentiation. Thus, it is assumed, for example, that the complexity of training in the major 44.00.00 "Education and pedagogical sciences" is identical to the complexity of training in the major 08.00.00 "Engineering and construction technology".

In the funding standard, there is no differentiation between the areas of bachelor's training and specialties in specialist's degree within the same value group. Indeed, the following areas of bachelor's training are assigned to the first value group: 01.03.04 Applied Mathematics, 43.03.03 Hospitality, 45.03.02 Linguistics. The following specialties: 01.05.01 Fundamental mathematics and mechanics, 45.05.01 as well as Translation and translation studies belong to the same value group. It is doubtful that the laboriousness of preparing for classes (including the development of appropriate methodological support) for teachers providing the implementation of educational programs in so different branches of science is an invariant amount.

This differentiation lacks in the majors of the academic and applied baccalaureate.

The wording of the "salary" article⁷ assumes that the standard includes labor costs and other employees associated with the performance of the educational service. For example, the second and partially the third value groups include the majors and specialties in the preparation of technical and technological orientation, practical and laboratory classes are related to the need to maintain a sufficiently large staff of training masters and laboratory technicians. Thus, the majors and specialties, which should provide the personnel with the needs of the modernized economy, are in an unequal

⁵ On the values of the basic standards of costs for the provision of public services in the field of education and science, youth policy, guardianship and trusteeship of underage citizens and the values of sectoral adjustment coefficients to them. "Ministry of Education and Science of the Russian Federation. Order of the Ministry of Education and Science of Russia of July 20, 2016 No. 884. Retrieved from: <http://xn--80abucjiibhv9a.xn--p1ai/%D0%B4%D0%BE%D0%BA%D1%83%D0%BC%D0%B5%D0%BD%D1%82%D1%8B/8698> (date of access: 01/02/2017). (In Russ.)

⁶ The territorial adjusting factors to the basic standards of costs of rendering public services for the implementation of educational programs of the higher education, programs of postgraduate professional education in an internship, and training of academic personnel in doctoral studies approved by the order of the Ministry of Education and Science of the Russian Federation of July 20, 2016 No. 884 for calculating the subsidy for financial security of performance of the state task for 2017 and for planning period of 2018 and 2019. Ministry of Education and Science of the Russian Federation № AP-74/18 vn. Retrieved from: <http://xn--80abucjiibhv9a.xn--p1ai/%D0%B4%D0%BE%D0%BA%D1%83%D0%BC%D0%B5%D0%BD%D1%82%D1%8B/8733> (date of access: 01/02/2017). (In Russ.)

⁷ The article, connected with the expenses for the payment of the teaching staff, is formulated as follows: "Labour costs and accruals for remuneration of the teaching staff (hereinafter TS) and other employees of the educational organization directly related to the provision of public services (highlighted by ER), including insurance contributions to the Pension Fund of the Russian Federation, the Social Insurance Fund of the Russian Federation and the Federal Fund of the Mandatory Medical IAOD insurance contributions for compulsory social insurance against industrial accidents and occupational diseases in accordance with the labour laws and other normative legal acts containing norms of labour law."

position in relation to conventionally natural-mathematical and humanitarian training (the first value group).

There is no indication in the wording of the article that the allowances for academic degrees and positions (that was present in the formulation of this article when determining funding standards for 2015) are included in the costs of the teaching staff.

It should be pointed out that in 2017, there will be significant changes in the wages of the employees of the educational organization that do not directly participate in the provision of educational services (administrative and management, training and support personnel and other employees performing auxiliary functions). If in 2016, the standard of expenses of this category of workers for the first bachelor's (specialty) and magistracy cost group was 19.64 thousand rubles, for the second value group—24.19 thousand rubles, for the third value group—27.41 thousand rubles. Then with funding for 2017, the standards fell from 50 % to 80 %: for the first bachelor's (specialty) and magistracy (12.42 thousand rubles), for the second (13.66 thousand rubles) and for the third value group (14,90 thousand rubles). That ground for assuming that in 2017, there will be a significant reduction in higher education institutions, first of all, of training and support staff. The volume of these reductions can be estimated from the results of monitoring universities in 2018.

Based on the study of the change dynamics in the standards for the payment of faculty staff from 2015 to 2017 for all regions of the Russian Federation, it can be concluded that the financing prospects for the vast majority of Russian universities in 2016 were worse than those in 2015. The exception is Moscow and St. Petersburg, for which the standard for the faculty staff payment (taking into account the corrective coefficients) has increased equally, as for some regions, including Arkhangelsk, Astrakhan, Samara, Kaliningrad, Sakhalin, Tula, Tyumen regions, Krasnodar, Kamchatka and Perm, Tatarstan, Sakha (Yakutia) and the Yamalo-Nenets Autonomous District. In two regions of Russia, the Republic of Karelia and the Vologda region, the most significant reduction in the rate of payments for the academic staff has been recorded in 2016 as compared to 2015. At the same time, in 2017 the academic staff payroll standard is lower than the value of 2015. In the Tyumen region, funding standards for 2017 are below the standards for 2016 (92.2 % by 2016).

The standard for the payment of academic staff (taking into account regional coefficients) in 2017 increased compared with 2016 (except for the Tyumen region). In addition, the growth was marked by considerable unevenness—from the minimum values (in districts: the Ivanovo region (128.7 %), the Arkhangelsk region (116.7 %), the Republic of Adygea (136.3 %), the Republic of Dagestan (112.1 %), the Penza region (132.9 %), the Yamalo-Nenets Autonomous District (130.5 %), the Altai Republic (129.0 %), the Kamchatka Territory (130.4 %)) to the maximum values: (Lipetsk region (150.2 %), St. Petersburg (149.2 %), the Volgograd region (144.6 %), Stavropol Territory (140.8 %), the Republic of Tatarstan (144.8 %), the Chelyabinsk region (141.1 %) , the Omsk region (146.6 %), Khabarovsk Territory (145.6 %)).

In order to reveal the level of uneven financial support for higher education institutions in the regions, we have introduced the indicator “the number of students per unit of faculty staff to meet the target salary in the current year.” This indicator is the result of dividing the annual salary fund of a teacher (including a charge on the payroll, which increases the ratio, for most regions, is 1.3) to the corresponding salary standard for faculty staff, taking into account the regional coefficient. As an example, we cite the Chelyabinsk region. The annual salary fund of the teaching staff unit is calculated on the basis of the average monthly nominal wage in the region, taking into account the need to achieve the target salary in 2017⁸. The average monthly nominal wage in the region in 2017 is determined on the basis of data on the average salary for January—September 2017⁹. The annual fund

⁸ In 2017, the average salary of the academic staff should be 180 % of the average salary of the region. Accordingly, the annual nominal wage fund in the region increases by a factor of 1.8. This calculation is approximate, since the fulfilment of the target figure requires the consideration of all sources of financing. Taking into account the fact that in the “salary” norm (in addition to the costs for the salaries of the faculty staff), there are also costs for the payment of labor of other workers directly connected with the provision of the state service, the real salary fund for the faculty staff will be smaller.

⁹ The average monthly nominal wage in 2015 was 27053 rub, (see Results of Federal Statistical Observation in the Labor Compensation Sphere of Certain Workers of the Social Area and Science for January—December, 2015. Teachers of Institutions of Higher professional Education. Federal State Statistics Service. Retrieved from: http://www.gks.ru/free_doc/new_site/population/trud/itog_monitor/itog-monitor4-15.html (date of access: 12.12.2017). (In Russ.); in 2016—27543 rub. (Results of Federal Statistical Observation in the Labor Compensation Sphere of Certain Workers of the Social Area and Science for January-December, 2016. Teachers of Institutions of Higher professional Education. Federal State Statistics Service. Retrieved from: http://www.gks.ru/free_doc/new_site/population/trud/

of the nominal accrued salary with a raising factor, taking into account the accruals ($K = 1,3$), should be divided into the corresponding standard in the payment for labor, taking into account the regional adjustment coefficient¹⁰. Thus, for the 1st and 2nd groups of bachelor's degree and specialty the value of the number of students per teacher is 12.3; for the first and second groups of the magistracy — 10.7.

It should be noted that the maximum value of this indicator we fix, for example, in the Republic of Dagestan: for the 1st and 2nd value groups of the bachelor's (specialty) — 13.6, for the 1st and 2nd cost groups of the magistracy — 11.8.

Assuming that at least 14 teachers are needed to ensure the implementation of the educational program in an area of training (based on the maximum number of disciplines that can be taught without reducing the qualitative indicators of the educational process) [10, p. 233]. Then for the Chelyabinsk region in the bachelor's degree major (the first profile of training), there must be trained at least 172 students (12.3×14) distributed in all courses, i.e. almost two complete groups on each course. At the same time, it will be difficult to recruit students enrolled with full cost compensation — higher education institutions are forced to focus on the values of basic standard costs for the preparation of one student, which in 2017 will significantly increase¹¹.

With a smaller number of students, a dilemma arises: either searching for additional sources of funding, or reducing the number of faculty staff. So, if the number of students is 100 people, corresponding to the ratio "number of students per unit of faculty staff" 7.1, then to achieve the target of salary for teachers, providing training for bachelors of the 1st and 2nd cost groups, the minimum volume of additional incomes should be more than 300 thousand rubl. per unit of teaching staff: $(12.3 - 7.1) \times 63.76 = 331.55$ thousand rubles. This is more than the threshold value of the indicator of the amount of income from Research and Advanced Development, attributable to the unit of faculty staff, which is used in monitoring the effectiveness of universities.

Since most regional universities do not have access to the most significant sources of funding — participation in competitions and federal targeted programs, providing such a volume of additional income per unit of academic staff is almost impossible.

As a consequence, the number of faculty staff is reduced and the number of taught subjects is increased for one teacher (potential decrease in the education quality), which is happening in regional universities.

For leading universities, the values of the basic standards of costs can be increased depending on both the average score of the USE of students entering the education program for undergraduate and specialist programs (the maximum value of the raising factor is 1.5), and the proportion of students who won the Olympiads in the total number of students admitted for training for these programs (the maximum value of the raising factor is 1.70) (Appendix No. 9 of the Ministry of Education Order No. 884).

The basic standard of costs for the preparation of students for the educational programs of magistracy, postgraduate (postgraduate studies in a military college), residency, internship programs, postgraduate professional training programs in internships, postgraduate (postgraduate studies in a military college) and in training scientific staff in doctoral studies can be increased by a factor (from 1 to 1.35). It is possible when achieving certain indicators of the publication activity and the volume of income from research and development (with the exception of the budget system of the Russian Federation, state scientific support funds), based on one unit of academic staff, including those working on the terms of full-time combination, without working under independent contractor agreements, for the year preceding the date of determination of the correction factors.

itog_monitor/itog-monitor4-16.html (date of access: 12.12.2017). (In Russ.); The average monthly nominal wage in 2017 was 27928 rub (Results of Federal Statistical Observation in the Labor Compensation Sphere of Certain Workers of the Social Area and Science for January-September, 2017. Teachers of Institutions of Higher professional Education. Federal State Statistics Service. Retrieved from: http://www.gks.ru/free_doc/new_site/population/trud/itog_monitor/itog-monitor3-17.html (date of access: 12.12.2017). (In Russ.)

¹⁰ The adjusting factors considering the target wage level of the teaching staff (the average salary in a region) — 1,723. The standard on compensation taking into account the adjusting factors when training bachelors (specialists) of the 1st and 2nd cost groups will make 63,76 thousand rubles; when training masters of the 1st and 2nd cost groups — 73,33 thousand rubles.

¹¹ Total standard costs per student, taking into account adjusted costs for utilities (with a regional coefficient), labour costs for teaching staff and employees of the educational organization that do not directly participate in the provision of educational services (administrative, managerial, training support staff and other employees performing auxiliary functions), for the 1st and 2nd value groups of the bachelor's (specialty) will be respectively 104.71 and 117, 91 thousand roubles; for the 1st and 2nd cost groups of the magistracy — 115.76 and 128, 98 thousand roubles, respectively.

In addition, brand universities have a specific resource that can reduce the academic load. In an interview with one of the authors of the program for higher education modernization—A. Volkov, the “recipe” for releasing the time for research activity is stated¹²: “To free time, it is necessary to de facto reform the spirit of the entire educational process. What I mean? Transfer most of the work to the student (highlighted by me ER). And this is a cultural moment. Mentally, students are not ready for this (I, of course, say in general), teachers are not ready for this either, if, on the whole, they speak in general, they are used to being guardians and “manhandle.”

Abroad, the trend is to reduce the hours of classroom activities and shift in emphasis towards independent work of students. Thus, in the work of G. Winston, it is shown that in leading American universities, it has become a practice to read introductory courses on large classes (hundreds of students simultaneously), and conducting seminars is assigned to graduate students [12]. P. Healy noted that the pursuit of elite US universities for well-known scientists has a negative impact on the main mission of the university—the teaching: “The status of the star does not now imply an excellent teaching. Compensation to the stars ... can reach \$ 200,000 only for one or two pairs a week, which, in its turn, strengthens the gap between the haves and have-nots teachers” [13, p. 91].

In Russia, training assistants are used for the release of “teachers from the routine training load. Usually, they are senior students whose wages are significantly lower” [14, p. 46].

E.V. Savitskaya and N.S. Altunina justified in their work that only brand universities can benefit from increasing the share of independent work of students. Such universities can be ahead of conventional universities “not at the expense of providing higher quality educational services, but by selecting the best entrants and a powerful effect of self-learning.” Elite universities “redistribute the efforts of teachers from teaching students in favor of scientific activities in order to maintain high positions in the ratings. The university does not suffer any statutory losses, since attracting the best entrants, it benefits from “skimming the cream”—the education level of its students is supported by their abilities and the self-education effect, even with less participation of teachers (highlighted by ER) [15, p. 130].

Priorities in assessing the productivity of a high school teacher in the context of threats to the human resources in regional universities

Hypothesis 3. Changing the approach to assessing the productivity of scientific activity is a potential threat to the preservation of the human resources in regional universities.

In indicators of assessing the effectiveness of the system of higher education in general and of universities in particular, there are no indicators that can really judge the effectiveness (as a ratio of the result and costs). Priority in assessing the effectiveness of scientific activity is the publication activity (and citation) in the journals that are a part of the leading science-based databases of Web of Science and Scopus.

Based on the analysis of the data of the scientific electronic library on the publication activity indicators of leading universities (Lomonosov Moscow State University, a part of the national research and federal universities), from 2007 to 2016¹³, it can be concluded that the number of publications in journals, indexed in the leading international science-based databases Web of Science and Scopus has considerably grown. However, the number of the received patents by universities was steadily declining

¹² Andrey Volkov: Uchebnoye zavedenie dolzhno narashchivat chelovecheskiy kapital [Andrey Volkov: Educational institution should increase human capital]. (2016, February 11). Strategiya nauchno-tehnologicheskogo razvitiya Rossii [Strategy of scientific and technological development of Russia]. Retrieved from: http://sntr-rf.ru/expert/andrej_volkov_110216/ (date of access: 20.03.2017). (In Russ.)

¹³ According to the scientific electronic library eLIBRARY.RU: Moscow State University. M. V. Lomonosov. Retrieved from: http://elibrary.ru/org_profile.asp?id=2541 (date of access: 09.12.2017); Moscow State Technical University. N.E. Bauman (National Research University). Retrieved from: http://elibrary.ru/org_profile.asp?id=665 (date of access: 09.12.2017); National Research Technological University MISIS. Retrieved from: http://elibrary.ru/org_profile.asp?id=361 (date of access: 09.12.2017); National Research University “Higher School of Economics.” Retrieved from: http://elibrary.ru/org_profile.asp?id=421 (date of access: 09.12.2017); National Research Nuclear University MEPhI. Retrieved from: http://elibrary.ru/org_profile.asp?id=353; (date of access: 09.12.2017).

National Research Tomsk Polytechnic University. Retrieved from: http://elibrary.ru/org_profile.asp?id=573 (date of access: 09.12.2017); National Research Tomsk State University. Retrieved from: http://elibrary.ru/org_profile.asp?id=366 (date of access: 09.12.2017); Ural Federal University. The first president of Russia BN. Yeltsin. Retrieved from: http://elibrary.ru/org_profile.asp?id=290 (date of access: 09.12.2017); South Federal University. Retrieved from: http://elibrary.ru/org_profile.asp?id=322 (date of access: 09.12.2017); Kazan (Privolzhsky) Federal University. Retrieved from: http://elibrary.ru/org_profile.asp?id=198 (date of access: 09.12.2017); Siberian Federal University. Retrieved from: http://elibrary.ru/org_profile.asp?id=4007 (date of access: 09.12.2017).

Indicators of the publication activity of leading universities, 2007–2016

University	Publication activity by years									
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	Number of monographs / Number of patents									
Lomonosov Moscow State University	67	97	100	118	116	154	113	158	181	181
	7	15	24	12	29	11	3	7	1	2
Bauman Moscow State Technical University(NRU)	44	39	63	59	64	54	46	55	52	51
	93	102	138	113	109	166	68	107	45	78
NUST MISIS	3	6	2	1	6	5	7	5	6	9
	0	1	0	0	0	2	0	2	0	0
Higher School of Economics (NRU)	24	29	25	42	62	46	59	72	76	74
	1	0	0	0	0	1	0	1	0	0
MEPhI (NRNU)	0	2	3	2	3	1	9	39	26	11
	0	0	0	0	0	1	1	0	0	0
Tomsk Polytechnic University	9	9	12	7	22	22	20	41	18	19
	4	4	8	5	4	15	28	7	4	0
Tomsk State University	60	70	71	82	94	72	61	60	55	41
	50	90	92	86	88	118	16	10	10	3
Ural Federal University (UrFU)	103	107	140	103	114	97	81	104	105	168
	138	144	169	130	161	194	37	23	14	17
Southern Federal University (SFedU)	66	108	102	126	117	131	118	177	187	275
	42	77	80	59	76	96	26	16	11	4
Kazan Federal University	14	24	27	18	27	33	34	41	64	63
	1	2	0	2	1	2	7	3	4	0
Siberian Federal University	64	68	95	113	154	118	142	123	95	104
	116	121	160	158	196	206	26	25	16	8

(Table 1)¹⁴. In most universities, the peak of patent activity occurred in 2012, after which it fell sharply. This is largely due to the fact that the proceeds from the use of the results of intellectual activity—a potential source of income, which in the overwhelming number of universities is close to zero (11, p. 98]. Thus, of all the universities represented in Table 1, according to the results of monitoring the effectiveness of universities in 2017¹⁵, only two universities had the share of funds received from the use of intellectual property results exceeded the value of 1 %—the Southern Federal University (5.50 %) and the Ural Federal University (1.34 %).

The scope of this article does not allow conducting the quality analysis of the publications indexed in the leading international science-metric databases. The research aimed at revealing the specific gravity of publications in “junk” foreign journals, provided with the “help” of intermediaries, appears to be relevant. From 2012, the Ministry of Education and Science of the Russian Federation, either intentionally or unwittingly, contributed to the demand creation for the publication of research results (primarily in the humanities, social and economic sciences) in journals indexed in the Web of Science and Scopus and the emergence of an “intermediary institute” to meet this demand.

¹⁴ The reference to scientific electronic library eLIBRARY.RU is not absolutely correct: on the different numbers of addresses, the different numbers of patents (and monographs) are shown, which can differ many times. Nevertheless, the given values provide strong evidence to a steady trend, connected with decrease in patent activity.

¹⁵ Informatsonno-analiticheskie materialy po rezul'tatam provedeniya monitoringa effektivnosti deyatelnosti obrazovatelnykh organizatsiy. Monitoring 2017 [Information and analytical materials by results of carrying out monitoring of efficiency of activity of the educational organizations. Monitoring 2017]. (2017). Ministerstvo obrazovaniya i nauki Rossiyskoy Federatsii. Glavnyy informatsonno-vychislitelnyy tsentr [Ministry of Education and Science of the Russian Federation. Main data processing center]. Retrieved from: <http://indicators.miccedu.ru/monitoring/?m=vpo> (date of access: 05.07.2017). (In Russ.)

The ratio of the number of articles and the number of issued patents, 2011–2015

University	The ratio of the number of articles to the number of patents by years				
	2011	2012	2013	2014	2015
MIT (Massachusetts Institute of Technology)	9,4	10,9	10,2	8,5	8,4
Cornell University	22,6	26,2	22,0	18,8	18,2
Johns Hopkins University	24,7	25,8	24,1	22,7	22,2
MSU (Lomonosov Moscow State University)	4	16,4	42,4	45,6	45,4
MIPT (SU) (Moscow Institute of Physics and Technology (State University))	108,3	130,7	71,2	122,3	136,1

Source: Senchenya, G. (2017, April 18). Razvitie sfery intellektualnoy sobstvennosti v interesakh MSP. Rospatent [Development of intellectual property in the interests of SMEs. Rospatent]. Moscow. Retrieved from: http://www.rupto.ru/press/news_archive/inform2017/senchenyaispace/infospaceSenchenya.pdf (date of access: June 20, 2017). (In Russ.)

It is essential that Russian universities far outstrip foreign ones by the number of published articles per patent¹⁶ (Table 2). On the one hand, this fact testifies to the strength of fundamental research. On the other hand, it can be regarded as a “brain drain”. Russian universities do not earn anything on patents, while only Stanford University from 1990 to 2015 received more than one billion dollars in technology transfer.

For example, in Europe, as a part of the task of rationalizing public expenditure on Research and Advanced Development, it is expected to strengthen the links between universities and industry by encouraging the creation of science parks and university patents [16, p. 6].

In the US, in December 1980, after the entry into force of Baye-Dole’s Act¹⁷ [17], patent activity in universities increased substantially: in 1980—250 patents; 1992—almost 1500 patents; 1998—2,900 patents; 2003—3,629 patents, in 2010, the aggregate number of universities (universities + colleges) of patents increased to 4,500.

With regard to university patenting, in the strategy implemented by the Ministry of Education and Science of the Russian Federation, no support measures have been envisaged since 2012.

It should be emphasized that the top Russian universities do not occupy the top lines in the rating of universities that are included in the top 100 of the holders of the largest patent portfolios of the Russian Federation for 2010–2015. The leader is the Volgograd State Technical University, which has 988 patents. Voronezh State University has 985 patents, Kazan State Energy University—918, Ulyanovsk State Technical University—906, Kuban State Agrarian University—888, Kuban State Technological University—761 patents. For comparison: Bauman Moscow State Technical University (National Research University)—247 patents, Moscow State University. M.V. Lomonosov—184 patents [19, p. 69–70].

Leading universities can afford a strategy in which a reduction in the number of activities to obtain the results of intellectual activity leads to minimal income from their use. It is so because these universities have access to the most significant sources of research funding for participation in competitions and Federal Target Programs [20].

For regional universities, it is extremely urgent to increase patent activity and increase the proportion of funds obtained from the use of intellectual property. This is the source of the preservation of human resources and its reproduction. At the same time, the solution of this problem is connected with the change in the corresponding methodological guidelines for the development of Russian higher education.

Conclusion

The existing system of the financing of the higher education does not stimulate the innovative development of regional universities. Moreover, along with priorities in assessing the productivity of a high school teacher, can be seen as a false guideline for the development of higher education.

¹⁶ A patent shield or a sword? Science and technology of the Russian Federation. S & TRF. RU. 12/12/2016. [Electronic resource]. URL: http://elibrary.ru/org_profile.asp?id=198; (date of access: June 20, 2017).

¹⁷ The law required, among other things, that universities file patent applications for discoveries made in studies sponsored by the federal government and actively seek ways to extract profit from them. Universities also had to share their income with inventors and direct a certain portion of the funds to research and educational purposes [18].

These guidelines contradict the Strategy of Scientific and Technological Development of the Russian Federation in the part of solving the task for forming an integral system of sustainable reproduction and attracting personnel for the scientific and technological development of the country. The strategy for the development of higher education, implemented since 2012, potentially contributes to increasing the differentiation of socio-economic development of the regions, to increasing disparities in the settlement system, due to the desire of best graduates going from regions to the cities in which branded universities are concentrated.

The need to develop the strategy for the innovative development of regional universities is being updated, providing for the following:

a) a change in the approach to financing higher education on the basis of an expert assessment of changes in the population between the ages of 17 and 30 and the increase in the number of students enrolled in universities after 2018;

b) monitoring the academic hours of teachers in higher education and determining the minimum allowable number of teachers for the qualitative implementation of each educational program. It should be realized on the basis of legislatively established norms for the workload of teachers, taking into account the European experience¹⁸. It involves making changes in the system of the financing of higher education, which will consider the labor intensity of the educational programs being implemented;

c) the allocation of targeted funds in accordance with the state task for the creation of educational innovations. Legislative consolidation of the corrective coefficients application taking into account the quality of educational and research activities to the basic standards of costs. The assessment of the quality of educational activities should be based on the identification of the fact and dynamics of trainees' knowledge, skills and abilities increment. At the same time, it is necessary to introduce indicators that assess the system of educational work in the educational organization, and to determine the values of the corresponding corrective coefficients;

d) stimulating the creation of breakthrough social and technological innovations due to corrective coefficients to the basic standards of costs, taking into account the activity in creating the intellectual activity results (the number of applications and patents received) and the amount of income received from using the intellectual activity results created by the university.

We associate the prospects for further research with the development of technologies for identifying the agents of influence in the field of education and academic science and methods for assessing damage from their activities.

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¹⁸ For example, in France, the standards for the workload of a full-time teacher of higher education are determined by the Decrees of the Government of the French Republic (see Décret No. 2009–460 du 23 avril 2009 modifiant le décret No. 84–431 du 6 juin 1984 fixant les dispositions statutaires communes applicables aux enseignants-chercheurs et portant statut particulier du corps des professeurs des universités et du corps des maîtres de conférences et portant diverses dispositions relatives aux enseignants-chercheurs JORF No. 0097 du 25 avril 2009, page 7137, texte number 9. Retrieved from: <http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000020552216&dateTexte=&categorieLien=id> (date of access: 03/20/2017).

In particular, within the limits of the rate, the maximum number of hours of lecture classes is 128 hours, the minimum — 42 hours. If a teacher only conducts practical or seminary classes (or any combination thereof), the maximum load is 192 hours, the minimum is 64 hours. As indicated in the Government Decree, the educational activity should leave to each teacher a considerable time for his/her research activities. At the same time, there are positions that prove the fact of overloading teachers in French universities (Sylvester Yue: “How many hours does the university lecturer really work?” Answer by Valerie Perkes. (see Sylvestre, H. Combien d’heures travaille vraiment un Universitaire? Réponse à Valérie Pécresse. (2009, Février 6). Liberation. Sciences.blogs.Lliberation.fr. Retrieved from: <http://sciences.blogs.liberation.fr/2009/02/09/trois-professeur/> (date of access: 20.03.2017).

The standard teaching work hours of professors of German universities is 8–10 hours per week, for universities of non-university type — 18 hours [21]. In the Czech Republic, the number of lecture hours for a professor is 8–10 per week, and — 130 hours per semester per one rate [22].

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