

# **INSTITUTIONAL-SOCIOLOGICAL ANALYSIS OF SCIENTIFIC AND SCIENTIFIC-PEDAGOGICAL PERSONNEL REGENERATION**

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## **Abstract**

The state system of personnel training for science and higher school in Russia is a two-layer system. On the first, future PhDs are taught, and the future Doctors of science are taught on the second, more elitist level. Topicality of the research is determined by the decrease in the effectiveness of the specialists' training system, and the low level of thesis defense while graduating. In this paper conducted the analysis of a training system of scientific and scientific-pedagogical personnel for science and higher school of Russia. Authors give their own periodization. Have studied regeneration of scientific and scientific-pedagogical personnel in its dynamics. Installed the trend in decrease in the number of organizations, which deal with the scientific and scientific-pedagogical personnel training. Have studied staff potential, sex and age characteristics of doctoral students and post-graduates contingent in the whole country as well as in the regional scale. Authors have made conclusions.

**Key words:** post-graduate, doctoral student, scientific personnel, scientific-pedagogical personnel

**JEL Code:** I 23, I 28, J 45

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## **Introduction**

The problem of training highly qualified personnel has existed, and will always exist in a developed technological society. In different periods it was implemented by different methods. In the USSR, with scheduled economy, planning also was in training of highly qualified staff. A lot of money was laid for this, and graduates of specialists for work in educational system, national economy and defense carried out in ever increasing volumes. As a result, in terms of the number of highly qualified staff, the country took the leading place in the world. With the collapse of the USSR and emergence in his borders of the Commonwealth of Independent States and creation of a number of the independent states including the

Russian Federation, and in connection with transition to the market relations, the situation has changed. Public financing has decreased, as the amount of graduates of high schools. Together with governmental financing, non-governmental financing has appeared. Besides the increasing number of students get an education abroad – the countries of Europe, China, England, participating in the state not state educational programs, and also pay for education themselves. Although the total costs for these purposes are not even close to those that were before. However these tendencies are not too much tragically. The new states with not so powerful public sector don't require such powerful financing of similar processes.

## **1 Theoretical and methodological backgrounds**

Various aspects of the preparation of scientific and pedagogical personnel are presented in the works of many specialists from various positions and with different emphases. For example, some scientists study the working conditions, increase the average age, poor working conditions, low wages and the relatively low social prestige of the teaching staff social prestige need to be addressed (Varshavskii, Vinokurova, Nikonova, 2011). Others point to an increase in the requirements for improving the efficiency of the training of scientific and pedagogical personnel, determine the organizational and pedagogical conditions for the qualitative preparation of future graduate students and disclose the experience of its implementation in the former Soviet republic (Ukraine) (Spirin, Nosenko, Iatsyshyn, 2016). Kornoukhova G. from the historical point of view considers the procedure for awarding scientific degrees and titles in the context of the modernization of Soviet science (Kornoukhova, 2016). It is interesting to analyze the empirical study of the specifics of theoretical training in postgraduate studies in France, using the anonymous electronically cross-functional survey on theoretical teaching practices and ways to improve teaching methods (Faivre, Bibault, Leroy, et al., 2018). Researchers from different countries are looking for ways to intensively increase the human resources of scientific and pedagogical staff. Spieker V.G. described the French experience of preparing postgraduate and doctoral students, which allowed to remove isolation among scientists and create a positive atmosphere for capacity building in the field of science (Spieker, 2016). Others study the satisfaction of undergraduate students and their understanding of the quality of education in the process of writing a thesis and is not able to study the quality of education in the process of writing a dissertation. Intellectual challenges that PhD students need to experience (Cheng, Taylor, Williams et al., 2016). There are many studies on this subject in Russia and the countries of

the post-Soviet space. (Zhernov & Nehoda, 2017; Nasadkin, Shchegoleva & Pakhomov, 2016; Ibraev, Kul'Evsckaya, Ulez'Ko & Galants, 2015; Gorbatov, Maluk, Miloslavskaya & Tolstoy, 2004). Thus, we can say that the issues of postgraduate training of scientific and pedagogical staff are interesting to many scientists from different countries of the world, despite the difference in social, organizational and economic conditions, and this issue has not been fully disclosed.

### **1.1 Historiography and periodization**

What is the situation in the Russian Federation now? The transition to an innovative economy now is difficult and limited. The formation of the system of university and post-graduate training of scientific and pedagogical staff in Russia, conditioned by the global changes taking place in the country, will be presented in the form of authors periodization. 1st stage (1755–1917) – The institutionalization of science and education in pre-revolutionary Russia: the decree was issued by Empress Elizaveta in 1755; in 1791 – the first normative legal act on academic degrees was issued, it provided for the award of bachelor's, master's and doctorate degrees; in 1804, after Alexander the First approved the charters of the first three universities – Moscow, Kharkov and Kazan, the state system of training and attestation of Russian academic staff began to be formed. In general, by the beginning of the twentieth century in the field of training of academic staff, a unified system of requirements for the post of teacher of a higher educational institution was created. 2 stage (1917–1956) – Creation of new system of training of the top skills: since 1917 academic degrees and ranks of imperial Russia, gradation of teachers have been abolished. The uniform rank of professor and the general rank of the teacher are established, however in 1934 such primitive approach has been cancelled and regulations about creation of the Highest certifying commission where again the system of academic degrees and ranks and preparation of scientific and pedagogical and scientific shots through a postgraduate study was introduced (Kornoukhova G, 2016). 3 stage (1956–1987) – Improvement of system of training of the top skills: in 1956 regulations the defining measures for improvement of preparation and certification of scientific and pedagogical shots, dictated by breakthrough development of science and technology in the country have been adopted. 4 stage (1987–1995) – Reforming of system of science and education: in 1987 and 1989 the regulations defining the important directions of development are issued. 5 stage (1996–2014) – Since 2012 the legislation establishes legal, organizational and economic bases of education in the Russian Federation, the basic principles of state policy on preparation and

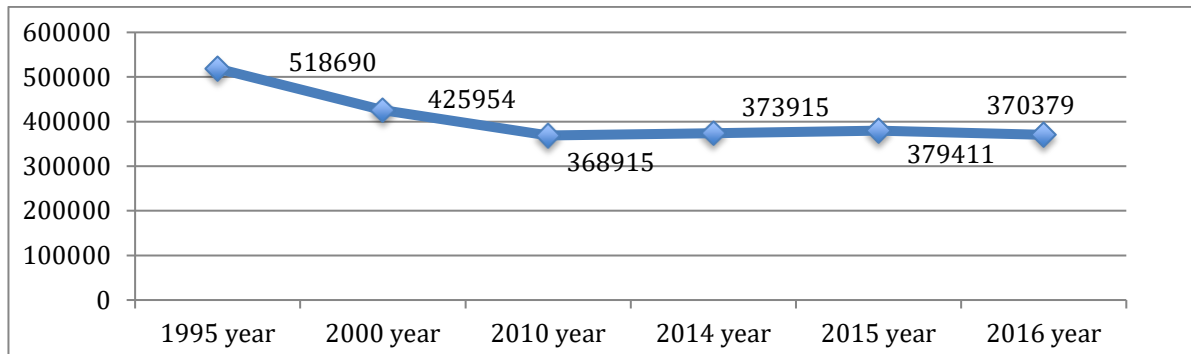
certification of scientific and pedagogical shots. Stage 6 (from 2015) – Modern institutional stage, characterized by the beginning of a significant restructuring of the system of training top skills personnel. It is planned to create not only councils for protection in the VAK system, but also councils of leading universities in the country. It is planned to introduce the defenses of the Ph.D. in both the West.

## 2 Research Results

We will consider the system of training of the top skills in Russia on the basis of studying of official statistics for the last 20 years. A phased analysis of the training system of high school staff allows us to a conclusion – the most powerful component of it was and remains the scientific training of teachers. It should be noted that the number of researchers in the country as a whole and across all branches of science has been declining for the past few decades, some authors note a reduction of the quality of training specialists (Varshavskii, Vinokurova, Nikonova, 2011). By consideration of quantity of scientific shots the tendency of reduction of number of the scientists, researchers and support staff (technicians and supporting staff) occupied in scientific developments and researches in recent years is absolutely accurately traced. So across Russia their number has decreased with 1061044 in 1995 to 887729 in 2000, to 736540 in 2010 and to 722291 in 2016. The number of this group in different years by 1995 is: in 2000 – 83.7%, in 2010 – 69.4% and 2016 – 68.1% – the regressive trend is available. It can hardly contribute to the development of both fundamental, and applied scientific research in the country. Moreover, among the employed in scientific research and development, the share of the researchers themselves fluctuates insignificantly and remains approximately constant. So in 1995, their share was 48.9% of the total number of people engaged in research, in 2000 – 48.0%, in 2010 – 50.0%, and in 2016 – 51.3%. There are disproportions in high-quality distribution of scientific shots. Receiving Candidate and doctor's degree becomes harder and harder and long-term procedure. Requirements for receiving an academic degree, reduction of number of dissertation councils, complications of system of appointment of opponents and other obstacles grow. Difficulties with supply with scientific devices, lack of funds for scientific business trips, complexity of scientific growth, a bureaucratization of science and research in the sphere of the higher education – are our realities. The low salary creates gives rise to a feeling of dissatisfaction with their work – "society values me low". It leads to the fact that a significant part of creatively active youth prefers the route "graduate school-thesis work-business or emigration". Many strong,

competitive post-graduates are ready to leave science and education and prefer other, more profitable areas.

**Fig. 1: Number of researchers having scientific degree in RF (pers.)**



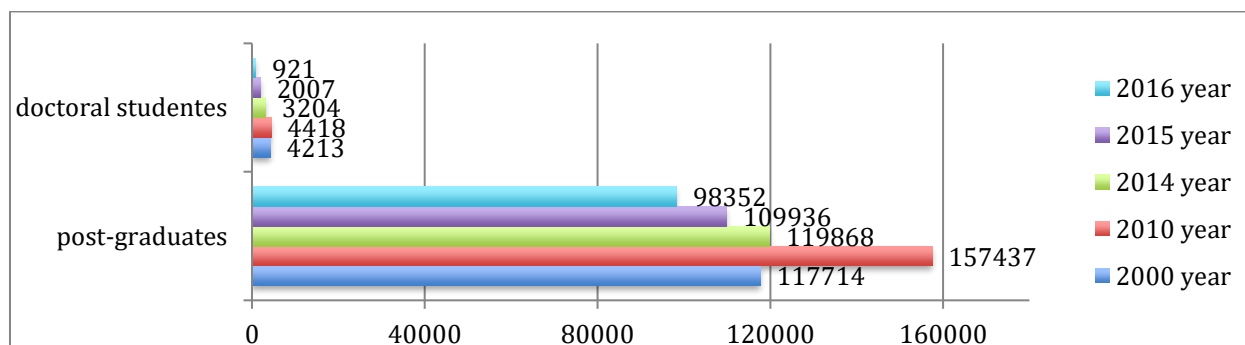
Source: Compiled by the authors drawing from the Central Base of Statistical Data of the Regional State Statistics Service, 2018

This situation leads to an inefficient distribution of researchers within the profession in terms of qualification, age, gender, and the presence of a degree. Consider the level of **qualifications**. So in 2015, from the total amount of researchers (379,411 people), doctors of sciences were 28046 people. (7.4%), and Candidates of Science 83487 (22.0%), that is, less than a third of researchers have a scientific degree, which seems insufficient for the quality of scientific research and teaching in the university. Let us consider the **age** composition of scientific and pedagogical personnel. The group under the age of 39 makes up 162785 people, which is 42.9% of the total amount, and the doctors of sciences (741 people) that in the total amount of researchers is 2.6% and candidates of sciences – 25615 people, 30.7%. This indicates a significant number of young people in the research team, but what part of it remains and chooses the career of a scientist or teacher is not known. If you look at a group over the age of 60, then its share is 25.5%, it is not too high, this is explained by legislative limitations and modern staff policies of many universities aimed at reducing retirement age employees. The smallest group of scientific and pedagogical staff is the group of 40-49 years, its share in the total number is only 13.2%. This group is significantly smaller in comparing with the group of 50-59-year-olds. This reflects the consequences of the crisis in the country in the 1990s and education in particular, when some of the young researchers were forced to change their place of work, due to a catastrophically low salary and a complete lack of prospects. These two groups represent the most workable age from 40 to 59 years,

researchers in this group – 119723 people, which is less than a third of the total – 31.5%, of which the proportion of doctors of sciences is only 7.4%, candidates of sciences – 25.4%, which is not normal. As we see from the schedule, middle age in general on group of doctors or candidates of science doesn't grow, so there is no rejuvenation of representatives of the research case that automatically does it less susceptible to innovations. As for **gender structure**, it slightly changes in recent years. So among all researchers in 2013 men were 59% of total amount. In group of doctors of science a share of men – 75.2%, and in group of candidates of science a share of men – 59.0%. Respectively female researchers from total amount were – 41.0%, and of them the doctor of science – 24.8%, and candidates of science – 41.0%. In 2015 the situation significantly hasn't changed. So among all researchers in 2015 men were 59.7% of total amount. In group of doctors of science a share of men – 74.3%, in group of candidates of science a share of men – 58.2%. Women researchers were 40.3%, the doctor of science – 25.7%, and candidates – 41.7%, respectively. In general, we can note the predominance of men in the elderly. This is due to the different age of retirement. Let's consider level of **degrees**. The ratio of researchers with degrees has improved recently. Thus, in 1995 they totaled 3.7% of doctors and 18.7% of PHDs, in 2000 it already was 5.2% and 19.7% accordingly, and later in 2010 – 7.3% and 21.9%, and in 2015 – 7.4% and 22.0%. Starting 2010 this index hasn't changed much and level of degrees remained more or less constant. However, as the data on volume of qualified personnel training shows, we can observe that this slight rise might be followed by the decrease in the number of people having scientific degrees. This is caused by the staff's natural ageing and a low rate of its regeneration.

Let's consider the system of **post-university education**. Regeneration of higher qualification personnel is realized in such forms as post-graduate and doctoral studies. Today the number of post-graduate and doctoral students in the country is 99273 persons. Certainly, the vast majority of them are post-graduates; there are a bit more than 90% of them. In 2000 the number of post-graduate students was 11714. Within the period of 2000–2010 the number of post-graduates in the country grew and reached its peak of 157437 persons and since 2011 it has been decreasing. In 2016 the number of post-graduates in the country was 98352 persons. Average age of post-graduate students increased and came to 28 years in 2016 (e.g. in 2010 it was 26 years). The number of female post-graduates in the total number of aspirants is 48%, and their ratio practically hasn't changed in recent decades and fluctuated within 44–48%.

**Fig. 2: Number of post-graduate and doctoral students (pers.)**



Source: Compiled by the authors drawing from the Central Base of Statistical Data of the Regional State Statistics Service, 2018

It is necessary to pay attention to the decrease in the efficiency of post-graduate system functioning. Before 1991 third of post-graduates completed their post-graduate study defending their thesis works, and later within 5 years another third defended their thesis works, but now the situation has changed a lot. In 2014-2015 only 18% of post-graduate students completed their studying with defense, and in 2016 this index decreased to 14.4% – 3730 people graduated with their thesis works defense. The number of doctoral students from 2000 to 2016 changed from 4413 to 921, decrease was 4.6 times, the ratio of young people inside the group also decreased from 55% to 53%. Admission to doctoral studies in the given years also decreased from 1637 to 397 i.e. decreased 4.1 times. Doctoral students graduating with thesis works defended decreased from 486 to 151, so it is 3.2 times. Thus, if in 2000 38.8% of those, who completed doctoral course, defended their thesis works, but in 2016 only 11.1% did it. This phenomenal reduction in the amount of doctoral candidates can not be explained by the desire of the government to sharply increase the competitiveness of Russian science. In 2016, one doctoral student has 107 graduate students, and one "new" doctor of science has 25 "new" candidates of science. The number of organizations conducting doctoral students training increased insignificantly since 2000, but since 2010 the decrease started and the number of such organizations almost halved from 602 to 385 in 2016.

Consider the characteristics of the contingent of doctoral and postgraduate studies in the **regional context**. The preparation of graduate and doctoral students in different regions of the country is conducted with varying degrees of activity. The highest indicators of training (activity) of graduate students in 2016, as in all previous years – In the Central Federal District (39110 people, or 39.8% of the total number of graduate students and 40.6%

graduated from the graduate school in Russia, or 10,542 people). Specifically, another thing is that this indicator of the region is mainly carried out at the expense of scientific and educational organizations in Moscow, because 72.5% of graduate students study in these organizations. At the second and third places in terms of the number of postgraduates are the Volga and North-West federal districts, respectively (15,910 people and 13,123 people, which is 16.0% and 13.0% respectively). The indicator of the completion of postgraduate training in 2016 was the highest in the North Caucasus Federal District, the percentage of graduates with a thesis defended 19.3%. In the second place was Privolzhsky Federal District – 16.6%, and Siberian – In third place (15.3%). Doctoral training – is conducted most actively in the Central Federal Region – 36.4% of the total number of doctoral students in Russia. The second place is held by Privolzhsky Federal Region, share of its doctoral students is 14.2% of the total number. The third place is shared between Southern and Siberian Regions with 11.4 and 11.3% accordingly. The pattern of those who defended doctorate after completing the doctoral course looks a little different. The first place-Siberian Federal Region with the rate of 19.2%, the second place-North-Caucasus (12.0%), the third-Ural Federal Region (11.7%). The lowest index of doctoral training efficiency is in the Central Federal Region.

## **Conclusion**

Having studied the trends in scientific and scientific-pedagogical staff in their dynamics, we can claim that there is a serious crisis in the system of scientific-pedagogical personnel training. Our research has indicated that the average age of researchers is 47 years, doctors of science – 63, PhD – 51, which is too much and need sufficient rejuvenation. The index of quantity of researchers seems to be alarming, it has decreased by 30.0% in the last 20 years.

Age and gender structure allows us to formulate a kind of idea on future age and gender staff structure. Decrease in doctorate activities efficiency is dramatic, its quantity decreased 4-8 times. The second problem is the effectiveness of post-graduate studies. The ratio of people, who defended thesis to the total number of graduates, has decreased. Cutback in the post-graduate and doctoral admission – decrease in effectiveness, it indicates a sufficient crisis in the system of scientific-pedagogical personnel training. Our analysis revealed that training of PhDs and doctors of science is conducted mainly in unsatisfactory way. It shows itself in overall cutback of the number of organizations engaged in post-graduate and doctoral training, in decrease in the (planned) numbers in the cutback of real admission and graduation for the given forms of studying, and also defending thesis at the appointed terms. The number



of organizations, conducting such staff training is being decreased. All the above mentioned indicates big problems in Russian science and in system of top skills personnel training, which will lead to colossal crisis in consequence and we will lose potential for the independent scientific development of modern Russia in the nearest future. It is necessary to make a cardinal reversal, aimed at the increase in scientific research financing, salary of scientific-pedagogical staff, creating comfortable conditions for them in terms of technical supply, providing their scientific trips expenses in order to take part in international conferences and internships in the leading scientific centers.

### **Acknowledgment**

The work was supported by Act 211 Government of the Russian Federation, contract № 02.A03.21.0006.

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