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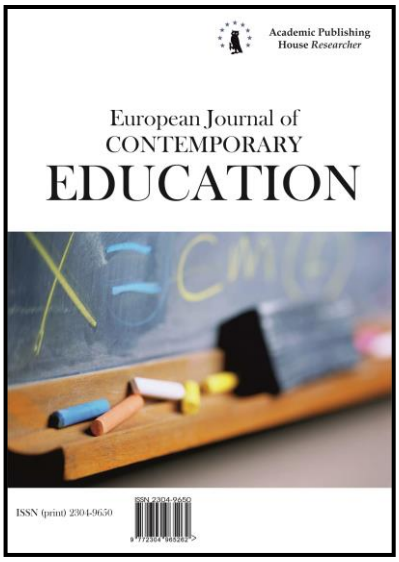

Institutional Approach to Establishment of a Structural Model of the Russian Academic Environment Development

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Abstract

The purpose of the present article is to generalize and unify the approaches to improvement of the institutional environment that ensures optimal functioning and sustainable development of the Russian academic sphere. The following conclusions and results have been obtained through presentation of the materials in the article:

- Improvement of the institutionalization of science and education must be reviewed in the context of evolutionary transitions that advance new demands for academic and human resourcing of state administration, financial and economic activities, and social development;
- Russian (just as Soviet) academic sphere is described by structural imbalances, which can be regarded both as a consequence of the shocking transition to market relations and as a consequence of imperfect institutionalization;
- Solutions proposed in the article are primarily aimed to unify the goals, tasks and results of interaction of the actors integrated into the institutional environment of the Russian academic sphere;
- Formalization of the structural model of development of the Russian education and science on the basis of the institutional approach (using the triple helix mechanism of H. Etzkowitz) can serve as a basis for the development of practice-focused concepts (as targeted programs, roadmaps), which will detail the specific measures;

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• Realization of these measures will ensure the structural balance of the national academic sphere, which in turn can be regarded as a cognitive and intellectual potential of the transition from industrial to post-industrial economic formation of society.

Keywords: institutional environment, academic sphere, cognitive economy, education, science, mentoring, education reform.

1. Introduction

Since the point of transition to market relations (in the 90s of the last century) and till the present time, the Russian education system has gone through several stages of reforms, which resulted in creation of a new institutional platform in this socially significant sphere (Tambovtsev, 2016). Processes of institutionalization of various economic and social spheres can be regarded as a natural evolutionary process of the society development. The neoclassical school has very actively criticized the institutional theory until relatively recently. At the same time, the adherents of institutionalism (in both economic and social context) opposed formalism and simplistic opinion on the processes that determine laws and areas of development (Alexander and Colomy, 1992).

The institutional environment (irrespectively of the object under study) is exogenously set and represents a set of established norms (of political, legal and social context), which determine the foundation that mediates the creation (production), exchange and distribution of various goods. In our earlier papers, when reviewing certain institutional aspects of the Russian education system, we came to a conclusion that from this point of view, such system is not described by sufficient self-organization, on the one hand, and is more overregulated than other social, economic or financial institutions, on the other hand. Besides, we have repeatedly pointed at the need for a scientific and practical view on institutionalization of the academic sphere (Dudin, Ivashchenko, 2016; Dudin et al., 2015), which can be based on the concept of the "triple helix model" proposed in the papers of H. Etzkowitz (Etzkowitz, 2010).

On a formal level, the institutional environment of Russian education is defined by a set of legal, subordinate, normative and regulatory acts, the main of which are the federal legislative acts:

1) The Constitution of the Russian Federation (Chapter 2, Article 43) (The Constitution, 1993);

2) Federal law "About education in the Russian Federation" (Federal Law, 2016);

3) Federal Law "About the improvement of the legal status of state (municipal) institutions" (Federal Law, 2010);

4) Strategy of the state national policy and Program of education development, approved by the President and the Government of the Russian Federation (Resolution, 2015; Decree, 2012)

5) Federal state educational standards (Federal Law, 2016), as well as Roadmaps that define benchmarks of development of the Russian academic sphere (Order, 2014).

The above federal acts in the field of national education should be complemented by regional and local acts that are adjusting procedures and coordinating administrative initiatives. Such a significant list of legal documents meant to institutionalize the Russian system of education should be regarded as an undoubted achievement of the legislative and executive activity in the top-down governance.

However, the Russian system of education at the same time faces a range of strategically important tasks that require additional solutions and introduction of new standards, unaccounted in the earlier published acts and documents. Besides, the problem of economic nature is also worth noting: the federal budget spending on the educational sphere reduces both in monetary and percentage terms (2016–2017 Federal Budget). This poses new threats to institutionalization of the educational sphere and poses social and political threats to social development, relatively stable in recent years (before the 2014–2015 crisis). As such, the problems of shaping the optimal institutional environment of the Russian academic sphere, taking into account the need to address all obvious and as of yet hidden issues, are urgent and require development, supplementation and clarification of existing scientific approaches.

2. Methods

This article is a short version presenting the results of the scientific research conducted by the faculty members of the interacademic research team (MSU, PFUR, RANEPA). The following methods were used in the paper:

• Method of content analysis that allowed to aggregate existing approaches to understanding the essence and tasks of institutionalization of the Russian academic sphere;

• Method of economic and statistical analysis aimed at generalization of trends describing the tendencies of functioning and development of the Russian academic sphere;

• Method of scientific synthesis aimed at formulation of practice-focused solutions on institutionalization of the Russian academic sphere, taking into account its role in support of the innovation-focused development of the economy.

We believe that it is necessary to make some key disclosures in the findings of the poll among the students of the three institutions listed above, which are presented in this article:

• Firstly, undergraduate were polled on an anonymous basis and by a random sample of the polled students with the assistance of volunteers from the student environment. This means that the recorded responses reflect only the public behavior of the students, but may not always express their real views on life prospects and professional career;

• Secondly, no evaluation of representativeness and sampling errors was conducted, as the survey was informal and focused on identifying current spirit in the student environment regarding the future employment and life priorities. As such, the obtained results in many ways are not statements of fact but reflect only individual correlations, which are expedient to justify or overturn in the future, based on the findings of the specially arranged monitoring of a representative sample and using the means of mathematical statistics;

• Thirdly, the findings of the poll can substantially deviate from the officially published financial reports of the institutions under study in the article about the employment of graduates. This is largely associated with the fact that student spirit and life priorities can rapidly change and transform under the influence of various external and internal factors (public and social processes, influence of family and relatives, etc.). This is confirmed by conducting short benchmark polls of the focus groups three months after the primary informal interviewing;

• Fourthly, the X^2 test (Pearson's chi-squared test) of the links between the factor variable (options of answers to the question) and resulting variable (number of students who gave the same answer to the question) in Tables 4, 5, 6 and on Figure 1 showed high statistical significance. This allows to suggest that the hypothesis about the need to intensify work with student audience by improving the institutional environment of academic sphere is sufficiently justified.

The formula to test the statistical significance using X^2 (Pearson's chi-squared test) appears as follows:

$$\chi^2 = \sum_{j=1}^{e} \frac{(n_j - np_j)^2}{np_j}$$

Where:

p_j is a probability that the value of the factor variable under study falls within the j-th interval on the basis of the distribution law $F(X)$;

n_j is a number of observations of the resulting variable in each interval of the obtained responses.

The statistical significance using X^2 (Pearson's chi-squared test) was calculated with help of STATISTICA software package (version 12.6).

3. Review of literature and research

A sufficient set of interpretations of the concept of "the institutional environment of an academic sphere" can be met in the Russian and foreign academic literature (Tambovtsev, 2016; Kleiner, 2004; Bessolitsyn, 2015; Bringle, Hatcher, 2000; Gordon et al., 2005; Zhukova, 2011).

Russian authors and researchers largely focus their attention on the legal aspects and state regulation of the academic sphere. On the contrary, from the point of view of foreign academicians, the institutional environment is reviewed in the context of self-organization and development of norms of relations between the actors, which determines regular and predictable changes in the academic sphere.

While integrating the first and the second methodological and theoretical aspect into the research environment, we suggest to define the institutional environment of the academic sphere as follows: The institutional environment of the academic sphere is a set of socio-political, legal,

economic and technological norms that form a strategic basis for establishment and distribution of the socially important benefit realized both in the interests of an individual (group of individuals) and in the interests of the state. As such, shaping the institutional environment of the academic sphere can be defined as a constantly renewed process aimed at supporting the sustainable development of science and system of education in accordance with the needs of the economy and society, national priorities and interests.

The interpretation of the concept of "the institutional environment of the academic sphere" presented above is fully consistent with the basic tenets of institutionalism and scientific research results showing that the academic sphere is one of the key elements in the processes of the national socio-economic development. While the knowledge resource and intellectual capital of the nation (of a country or a state) was mentioned by only a few Russian and foreign scientists in the last quarter of the XX century (Abalkin, 2002; Nonaka, Takeuchi, 1995; Quinn, 1992), several fundamental papers on cognitivism of the socio-economic and socio-political processes (Lewis and Lee, 2015; Traynev, 2014; Modern, 2014) were created in the first decade of this century. The academic sphere played a special and quite often a dominant role in these papers. In other words, science and education were considered not only as factors of the scientific and technological progress, but also as factors of global development that will be able to ensure the physical preservation of modern civilization and global ecosystem that is optimally necessary for the living conditions of people.

Issues of the institutional structuring of the development models in various fields, including the academic sphere with various methodological positions, are disclosed in the papers of J. Sabato, who pointed out that the productivity of the economy and society depended on the level of technological development (Sabato, 1979), i.e., speaking in modern language, – on the intensive use of cognitive or knowledge resources, the intellectual national capital. Although the papers of J. Sabato do not explicitly mention the role of the academic sphere in the processes of the socio-economic development, the studies of B.-A. Lundvall (Lundvall, 1992) and R. Nelson (Nelson, 1993) raised and updated this problem to the full extent. However, the institutionalization of the economic, academic and innovation sphere in the papers of the above academicians assumed the presence of the dominant structure. J. Sabato believed that the state had to be this dominant institutional structure, while B.-A. Lundvall and R. Nelson, on the contrary, pointed out that the business or entrepreneurial segment had to be a dominant structure.

As the evolutionary development of the academic economic thought demonstrated, the presence of the dominant structures is not a guarantee of an optimal institutionalization of various areas of workmanship, because it is a simplistic and formalistic approach that assumes that the dominant structure allocates the functional roles of other actors and partially repeats their purpose. Therefore, from the modern point of view, it is important in shaping the high-quality institutional environment that factors of certain spheres interacted as partners, focused on ensuring the sustainable socially and environmentally responsible development and the growth of national wealth.

In our opinion, an academic paper of H. Etzkowitz (Dudin, Ivashchenko, 2016) is worthy of special attention in the latter aspect, where he proposes a triple helix model, which describes the partnership of the state, business and academic sphere in order to create national innovation systems, which accumulate resources and reserves that support transformation of the socio-economic processes and industrial development paradigm switch to the post-industrial, socially and environmentally responsible concept. Each actor realizes its own functions in the triple helix model:

а) The state creates the conditions required for establishment of a national innovation system, which is a strategically important junction that determines the specificity of contractual three-way relationships (per se, state, business and academic sphere). Besides, the state takes on obligation to fund basic science and convert scientific knowledge into applicative;

б) Academic sphere, in turn, is a producer of both basic and applicative scientific knowledge, which carries out developments in the interests of both the business and the state at the same time. In this case, funding of the academic sphere should be parity and distributed among the state (basic research and its conversion), business (fundamental and applicative research and its commercialization) and the area under study (commercial and targeted research and development, venture and other contracts);

в) Business is a key recipient of basic and applicative knowledge of mostly civilian nature. Through core competencies, this knowledge is transformed into knowledge-intensive solutions, which are described by high added value (at the microeconomic level). At the macroeconomic level, the systemic and synergy effect ensures the balanced economic growth and shapes a new type of national wealth based on the intensive use of knowledge established in the academic sphere with the direct assistance of the state and transferred to the business environment through the national innovation system.

As such, the triple helix model is a new consensus that ensures sustainability of the socio-economic development and defines a strategic role in this development of the national academic sphere.

4. Results

Over the past quarter of a century, the Russian academic sphere has passed the two key stages of reforming:

- The first stage must be associated with the early 90s of the last century, in which the inefficiency, cumbersomeness and structural imbalance of the system of science and education was proved. At this stage, described by the dismantlement of the "Soviet statutes", the ideology was excluded from the academic sphere, paid education was allowed (from the elementary, including pre-school, and up to the highest level), and the amounts of public funding were reduced;
- The second stage of reforming was started in the early 2000s, where the structural basics of the academic sphere were reviewed (unified exam, rankings, performance criteria, two levels of the higher school, etc.). The funding of the academic sphere was also partly increased, the federal educational standards were adopted, and the less efficient educational institutions merged with the more efficient ones.

Many tend to consider the consequences of the first stage of reform and institutional changes in a negative way only. They have objective reasons – for example, the headcount of academic teaching staff reduced during the first stage of reform, the facilities and resources of many educational institutions fell to decay, academic sphere was funded using a residual principle.

General economic instability led to decline in the birth rate, which in turn led to a decline in the number of students. For example, while the number of students in secondary schools in the period from 1980 to 2000 inclusive was about 20-21 mln people, this figure decreased by 25.4 % compared to 1990 by 2005 (see Table 1). At the same time, the number of teachers in secondary schools increased by 7.9 % in 2005 compared to 1990, and increase in their number peaked in the period of the first stage of reform from the 1990s to the early 2000s, inclusive. Decline in the number of students and increase in the number of teachers resulted in a significant decrease in the burden on teachers (measured by the indicator "number of students per teacher"), almost by half (in 2005 compared to 1980).

Table 1. Analysis of the number of secondary school students and teachers in the period from 1980 to 2005, thous. people (Population. Education, 2016)

Indicator	Period						
	1980	1990	in % to 1980	2000	in % to 1990	2005	in % to 1990
Number of secondary school students	20,216	20,851	3.1	20,493	-1.7	15,559	-25.4
Number of secondary school teachers	1,135	1,460	28.6	1,751	19.9	1,575	7.9
Ratio of the number of students and teachers	17.8	14.3	-19.8	11.7	-18.1	9.9	-30.8

A decline in the number of students is also observed in the segment of secondary vocational education. A decline in the number of students in the segment of the elementary vocational education (working specialties) in also registered since 2005, see Table 2.

Table 2. Analysis of the number of students in the segment of elementary and secondary vocational education from 1980 to 2015, thous. people (Population. Education, 2016)

Indicator	Period					
	1980	1990	2000	2005	2010	2015
Number of students in the field of the elementary vocational education	-	-	-	702.5	580.5	403.0
Number of students in the field of the secondary vocational education	2,641.6	2,270.0	2,360.8	2,590.7	2,125.7	2,103.1
Number of students in the field of the higher education	3,045.7	2,824.5	4,741.4	7,064.6	7,049.8	4,766.5
Ratio of the number of students of the higher and elementary/secondary education	1.15	1.24	2.01	2.15	2.61	1.90

On the contrary, the number of students in the segment of the higher education increased by almost 1.7 times by 2000, and by more than 2.5 times by 2005. Accordingly, while there was an approximately equal ratio of the number of university students and the number of students in the field of the elementary/secondary vocational education in 1980–1990, by the beginning of the second stage of reform (2000), there were at least 2 university students per student of the elementary vocational and special vocational education. This trend continued upwards until 2010 and was partially offset in the past 5 years due to institutional transformations that took place during the second stage of the reform of the Russian system of science and education.

As for the problem of development of the research segment, we believe that it must be noted that the structural and dynamic changes can also be observed here, which can also be considered as a consequence of the reform and institutional changes (see Table 3). The number of students in post-graduate and doctoral studies has steadily grown until 2010 (the growth rate amounted to almost 33 % in 10 years).

Table 3. Analysis of indicators of the research segment from 2000 to 2015, people (Population. Education, 2016)

Indicator	Period			
	2000	2005	2010	2015
Number of post-graduate and doctoral students	121,927	147,171	161,855	111,943
Completed post-graduate and doctoral studies, total	26,079	34,978	35,022	27,212
of which defended a thesis	7,989	11,166	9,947	4,832
Proportion of those who completed post-graduate and doctoral studies in the total number of students, %	21.4	23.8	21.6	24.3
Proportion of post-graduate and doctoral students who defended a thesis in the total number of graduates, %	30.6	31.9	28.4	17.8

To date, the number of current post-graduate and doctoral students declined by 31 % (in 2015 compared to 2010), which was largely due to the reforms of both educational and academic sphere (2010 – reform of the Russian Academy of Sciences). However, it must be noted that the efficiency of the research segment declined: while a third of post-graduate and doctoral students graduated after having defended a thesis in the period from 2000 to 2010, in 2015 this figure does not exceed 18 % of the total graduated. Moreover, it must be noted that the proportion of post-graduate or doctoral graduates does not exceed 21–24 % of the total number over the past 15 years.

On the one hand, this can be explained by the Pareto principle (80 % of the effects come from 20 % of the causes), but on the other hand, 30–50 % of funding for post-graduate and doctoral studies is made at the expense of budget funds, which means that in fact, the process of budgetary funding of the scientific research does not produce desired results. This is largely the cause of scientific, technical and technological lagging of Russia, as well as of underdevelopment of the venture entrepreneurship segment, which needs both research staff and specialists with higher education. However, anecdotal data indicate that only 4 out of 10 students of higher education who have graduated find job in their field. At the same time, one third of the officially registered unemployed are also university graduates who couldn't find a job in their field within the first five years after graduation (Statistical yearbook, 2013; Geleta, 2014; Toksanbaeva, 2013).

Three universities under study run programs to promote employment of graduates and students. At the same time, as shown by an informal poll, no more than 46 % of all surveyed undergraduates are going to seek employment in their field (see Table 4). Students of social and humane fields are least of all interested in seeking employment in their filed: only no more than 28 % of the total number of students surveyed are going to seek employment in their field. On the contrary, students of natural sciences and technical fields are more interested in seeking employment in their field (49.9 % and 60.2 %, respectively).

Table 4. Findings of the poll of undergraduates of PFUR, MSU and RANEPA (question: "Are you going to seek employment in the field of the acquired degree?")

Responses to the question	Field of education						Total result	
	Social and humane sciences		Natural sciences		Technical sciences			
	number of respondents	in % to total number	number of respondents	in % to total number	number of respondents	in % to total number	number of respondents	in % to total number
I am going to seek employment in my field	135	28.1	240	49.9	289	60,2	664	46.1
I am not going to seek employment in my field	202	42.1	139	28.9	116	24,2	457	31.7
undecided	143	29.8	102	21.2	75	15,6	320	22.2
Total number of respondents	480		481		480		1,441	100.0

The following data were obtained when conducting the Pearson's chi-squared test (X^2 testing) of the result of the responses to this question: number of degrees of freedom was 4, the criterion value was 104.009 (critical value at $p \leq 0.01$ is 13.227). The statistical significance between possible responses and quantitative distribution of these responses is quite high; in other words, there is a direct correlation between the choice of a possible response and the number of students who chose a specific response. The statistical significance of the students' responses to this question using the Pearson's chi-squared test was calculated with help of STATISTICA software package.

Next, the students who are going to seek employment in their field were asked about the way of finding a job (Table 5).

Table 5. Findings of the poll of undergraduates of PFUR, MSU and RANEPA who are going to seek employment in their field (question: "Using who or what are you going to get a job?")

Responses to the question	Field of education						Total result	
	Social and humane sciences		Natural sciences		Technical sciences			
	number of respondents	in % to total number	number of respondents	in % to total number	number of respondents	in % to total number	number of respondents	in % to total number
assistance of friends, relatives, parents	71	52.6	89	37.1	60	20.8	220	33.1
under employment programs (with assistance) of the university	22	16.3	52	21.7	36	12.5	110	16.6
through the public employment service, recruitment agencies	18	13.3	29	12.1	46	15.9	93	14.0
on the free labor market	24	17.8	70	29.2	147	50.9	241	36.3
Total number of respondents	135		240		289		664	63.7

About 33 % of students who are going to seek employment in their field need assistance of friends, relatives or parents in getting a job. 36 % more students are going to get a job on the free labor market. In this case, a pattern is observed indicating that the vacancies on the free labor market increasingly constitute the area of interest of students of technical fields, while students in the fields of social, humane and natural sciences to a greater extent rely on the assistance of the inner circle. The following data were obtained when conducting the Pearson's chi-squared test (X^2 testing) of the result of the responses to this question: number of degrees of freedom was 6, the criterion value was 71.079 (critical value at $p \leq 0.01$ is 16.812). The statistical significance between possible responses and quantitative distribution of these responses is quite high. The statistical

significance of the students' responses to this question using the Pearson's chi-squared test was calculated with help of STATISTICA software package.

Next, the students who are not going to seek employment in their field were asked an additional clarifying question about their future project of life (Table 6).

Table 6. Findings of the poll of undergraduates of PFUR, MSU and RANEPA who are not going to seek employment in their field (question: "What is your project of life for the nearest future?")

Responses to the question	Field of education						Total result	
	Social and humane sciences		Natural sciences		Technical sciences			
	number of respondents	in % to total number	number of respondents	in % to total number	number of respondents	in % to total number	number of respondents	in % to total number
Run business/enterprise (parents', relatives', or will build my own)	85	42.1	27	19.4	19	16.4	131	28.7
I will continue education in Russia or abroad	9	4.5	31	22.3	60	51.7	100	21.9
I am going to enter a PhD program	3	1.5	5	3.6	12	10.3	20	4.4
I am going to look for any job closer to home	81	40.1	54	38.8	17	14.7	152	33.3
I am not going to work at all	24	11.9	22	15.8	8	6.9	54	11.8
Total number of respondents	202		139		116		457	100.0

Just over a third of students who are not going to seek employment in their field are interested in finding any job closer to home.

About 22 % of students are going to continue education (in a different or related field), another 29 % are going to run business or enterprise. Almost 12 % of students who are not going to seek employment in their field are not interested in job per se (which is about 4% of the total number of students involved in this poll).

The following data were obtained when conducting the Pearson's chi-squared test (X^2 testing) of the result of the responses to this question: number of degrees of freedom was 8, the criterion value was 132.165 (critical value at $p \leq 0.01$ is 20.09). The statistical significance between possible responses and quantitative distribution of these responses is quite high. The statistical significance of the students' responses to this question using the Pearson's chi-squared test was calculated with help of STATISTICA software package.

As such, it becomes obvious that the two stages of reform and institutional changes have led to disparities in the academic sphere:

- Firstly, the number of high school students almost doubles the number of students of elementary and secondary vocational education. In this case, as shown by a conducted poll, no more than half of the surveyed university students are going to seek employment in their field. Education of these students is sponsored by the state, and therefore the costs of their education will not form the potential of growth in the national wealth in future;

• Secondly, the number of post-graduate and doctoral students, which has increased substantially over 2000-2010, showed almost proportional decline over the last 5 years. However, the number of post-graduate/doctoral students who graduated after successfully defending their thesis also significantly declined (from 30% to 18%) at the same time. This indicates that the research activities, including the one funded from the budget, are less focused on the production of scientific fundamental and applicative knowledge.

Meanwhile, it must be noted that life priorities and goals of the undergraduates in terms of employment are subject to rapid changes. During the benchmark poll (three months after the primary informal interviewing), the overall structure of responses to the question: "Are you going to seek employment in the field of the acquired degree?" changed significantly (see Figure 1).

It is obvious that undergraduates of the universities under study have substantially revised their views on employment over the past three months. On the one hand, the active work of the universities in promoting the employment of graduates largely contributed to this. The following data were obtained when conducting the Pearson's chi-squared test (X^2 testing) of the recorded changes in the choice of responses in the benchmark poll: number of degrees of freedom was 2, the criterion value was 44.300 (critical value at $p \leq 0.01$ is 9.21). The statistical significance between possible responses and quantitative distribution of these responses is quite high. The statistical significance of the students' responses to this question using the Pearson's chi-squared test was calculated with help of STATISTICA software package.

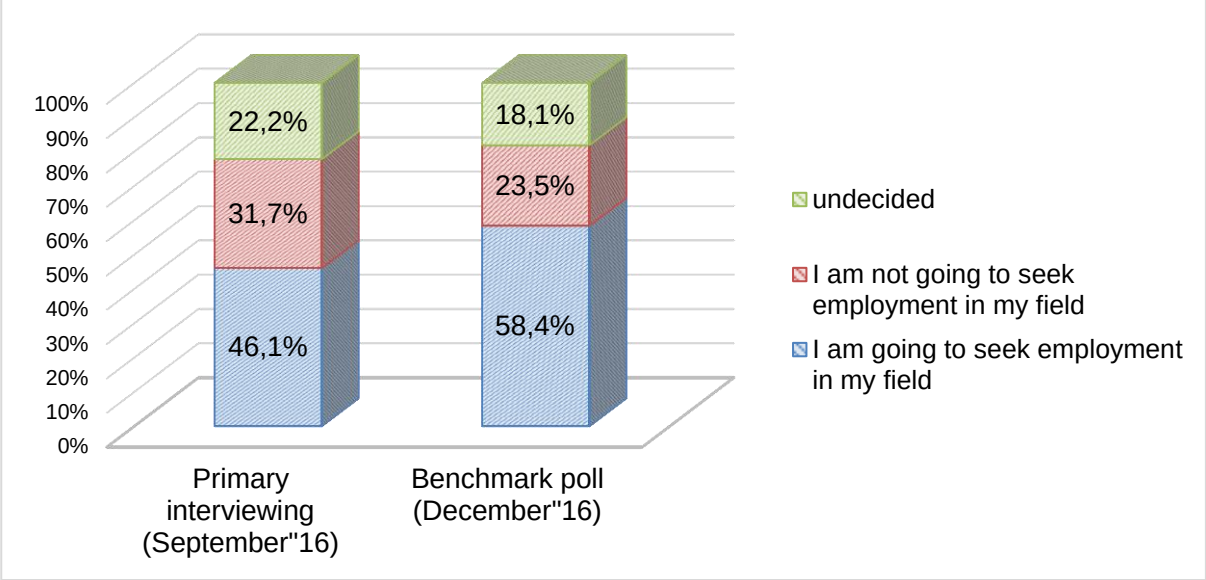

Fig. 1. Changes in the structure of responses of students of PFUR, MSU and RANEPA to the question "Are you going to seek employment in the field of the acquired degree?" in the benchmark poll 3 months after the primary informal interview

On the other hand, it must be understood that the students are the most mobile and the most quickly react to changes in the environment and the emergence of new incentives. This is why the institutionalization of academic sphere should be established using the "triple helix" concept, since it is an optimal and organic approach to the formation of intellectual capital of the nation, labor and knowledge (cognitive) resources that will be in demand in the economic, social field and in the field of science and public administration. The above allows us to argue that it is necessary to further develop and realize solutions aimed at development of the institutional environment of the Russian academic sphere.

5. Discussion

Proceeding to the statement of the main areas of development of the institutional environment, we must recall that the Russian academic sphere is still described by delayed effects in many ways, which are defined by so-called "Soviet legacy". On the one hand, the national education system was described by universalization during the Soviet period – all levels of education were aimed at teaching

students global thinking, ability to solve various problems and possess wide knowledge; not everything of this had practical application. This has had a largely positive impact on the economy and science development (rapid industrialization, a record fast overcoming of the consequences of the Great Patriotic War, the earliest development of nuclear and space technology).

But on the other hand, it became clear by the end of the 1980s – early 2000s that the established education system meets neither public nor scientific demands, and there were several objective reasons for this:

- Firstly, a task of the segment of the pre-school and school education was to fulfill the state order for the ideologically correct next generation with unified attitudes, needs and ideas. But at the same time, the communist ideology suffered from ostracism in everyday life, so the state and social orders for education were radically different in many ways;
- Secondly, extensive expansion of mass professions in the segment of elementary and specialized vocational education became particularly pronounced at a time when it was necessary to enlarge these mass professions by integration of several related professions and exception of the dying kinds of professional specialization;
- Thirdly, the trends of absence of demand in university graduates began actively manifest in the higher education sector. At the same time, the structural scientific imbalances manifested in the sphere of higher education: there was active training of specialists in physics, mathematics, engineering, chemical and biological sciences (with a focus on the military-industrial complex). Social, humane and natural sciences almost stagnated. This, by the way, became one of the reasons for the inefficiency of the first market reforms, as the economic science knew no alternative teachings except for Marxist economics.

Despite the fact that the Soviet education was among the world leaders in engineering, natural and exact sciences, a systemic crisis in the academic sphere only deepened. The scientific and pedagogical school established in the Soviet period and recognized across the world appeared already not always able to promptly respond to the changing demands of the society, state and economy. This is why a policy document "Pedagogics of cooperation", which appeared in 1986, in many ways became the necessary platform for change in both education and scientific fields (Amonashvili, 2008). The totalitarian pedagogy of coercion, predominating in comprehensive and higher school, started to recede into the background.

However, at the same time, the change of ideological vector in the establishment of the educational process did not allow to radically eliminate other accumulated problems that we have mentioned above. The structural imbalances largely caused the launch of the mechanism of self-destruction of the Soviet system of education and science. Although many of current experts (e.g. A.L. Sergeev (Sergeev, 2013), as well as public and political figures, e.g. representatives of the Duma factions G. Zyuganov, V. Zhirinovsky, S. Mironov and others believe that there was a certain "order" from the foreign elite to destroy the Soviet academic sphere (Rubin, 2015; Meeting, 2016), this actually was far from truth. The statistical data of the Soviet period is available in the public domain, indicating that, for example, about 40% of people with higher education did not work in their field but on the positions of direct and indirect workers in various production industries (Druzhilov, 2013; Lopatin, 2008).

At the same time, the academic sphere abroad was relatively balanced from institutional and socio-economic point of view. There was a notable segment of comprehensive (pre-school and school) education, segment of specialized and higher education, as well as a research segment (Thibault, 2012; Tuschling, Engemann, 2006). Accordingly, the task of comprehensive education was to prepare the children to receive specialized or higher education. Specialized education was a major supplier of human resources to the national foreign labor markets. Higher education ensured training resources for public administration and senior management of economic entities, as well as for the research sphere, which in turn fulfilled state and commercial orders for the development of fundamental and applicative solutions that would find application in all areas of activity.

Undoubtedly, the former and current principle of segregation in the academic sphere abroad largely creates the preconditions that form a significant segregation between the elite higher and mass higher specialized education. However, there is a social gap between higher school, research organizations and segments of the elementary/specialized vocational education in Russia as well. As such, by the beginning of market reforms, the Soviet education system does not ensure the

proper level of training of resources that were necessary for the establishment of the market economy. Currently, the Russian education system does not ensure the proper level of training of resources demanded in the innovation economy. It is obvious that the institutional imperfection of the Russian academic sphere is determined by both the "Soviet legacy" and the negative impact of the consequences that have arisen in result of the shocking transition from the command economy and the totalitarian society to the market (and then to the cognitive) economy and the democratization of socio-political processes.

Over the period from the late 90s of the last century to the beginning of the current decade, the Russian academic sphere, due to the residual principle of funding and not always logically consistent social and economic reforms, also faced the problem of structural imbalances that occurred in the Soviet education system. But while there was excess of graduating technical specialists in the Soviet system of education, the Russian system of education was, in contrast, dominated by graduates in the field of social and humane sciences. This was largely the result of development of the commercial basis in specialized vocational and higher education, since training of such specialists does not require the establishment of specific facilities, so education in social and humane sciences was primarily commercialized in the Russian academic sphere.

It can't be said that the partial translation of the academic sphere to commercial self-financing had an exceptionally negative effect. Establishment of the paid educational segment allowed to increase availability of the specialized and higher education, including the case of the shrinking military industrial area, where many civilian and military personnel were able to retrain on a paid basis and reintegrate in economic and labor relations with a new degree (Zhukova, 2011; Modern, 2014; Statistical yearbook, 2013).

Opinion polls reveal that students of the paid faculties and departments in many respects have a more responsible attitude to receiving knowledge than students receiving education funded by the state or businesses and organizations (Zhukova, 2011; Modern, 2014). Therefore, the thesis that education should be free cannot be considered true:

- Firstly, it creates preconditions for social dependency and increases financial burden on the state, which is generally not correct in the current economic conditions;
- Secondly, the academic sphere in innovation (cognitive) economy should be capable of creating and receiving economic benefits required for self-financing of both educational and research activities.

Summarizing the above, we consider it necessary to propose a range of solutions that will focus on the development of the institutional environment of the Russian academic sphere. First of all, we consider it necessary to develop a logically unified institutional structure model that ensures optimal functioning and sustainable development of the Russian academic sphere. This model is conceptually based on the understanding of the scientific foundations of the triple helix of H. Etzkowitz (Dudin, Ivashchenko, 2016), i.e. the partnership between the state, business and academic sphere itself (see Figure 2).

This structural model assumes that the institutional environment of the academic sphere is established and progresses through the coordination mechanism of multilateral interaction between the actors. At the same time, we consider it necessary to complement the triple helix model that integrates the interaction of the state, business and academic sphere with public institutions. At the same time, it is proposed to allocate two key areas of activity in the academic sphere: research and education. Each of the above activities in the academic sphere solves a range of mutually not repeated tasks. Therefore, it is proposed to allocate the following in the research area:

1) Fundamental segment, which solves the tasks of establishment of a theoretical and methodological framework that ensures development, testing and introduction of technology, critically important for the state, society and the economy, through long-term scanning of the scientific and technological horizons;

2) Applicative segment, which solves the tasks of establishment of a methodological framework that ensures the development, testing and introduction of product- and process-focused innovation that will be in demand in public administration, socio-economic and financial industries and sectors. At the same time, considering that the fundamental segment solves the tasks of supporting national security, the military and space critical technology can also be used in civil production via spin-off processes.

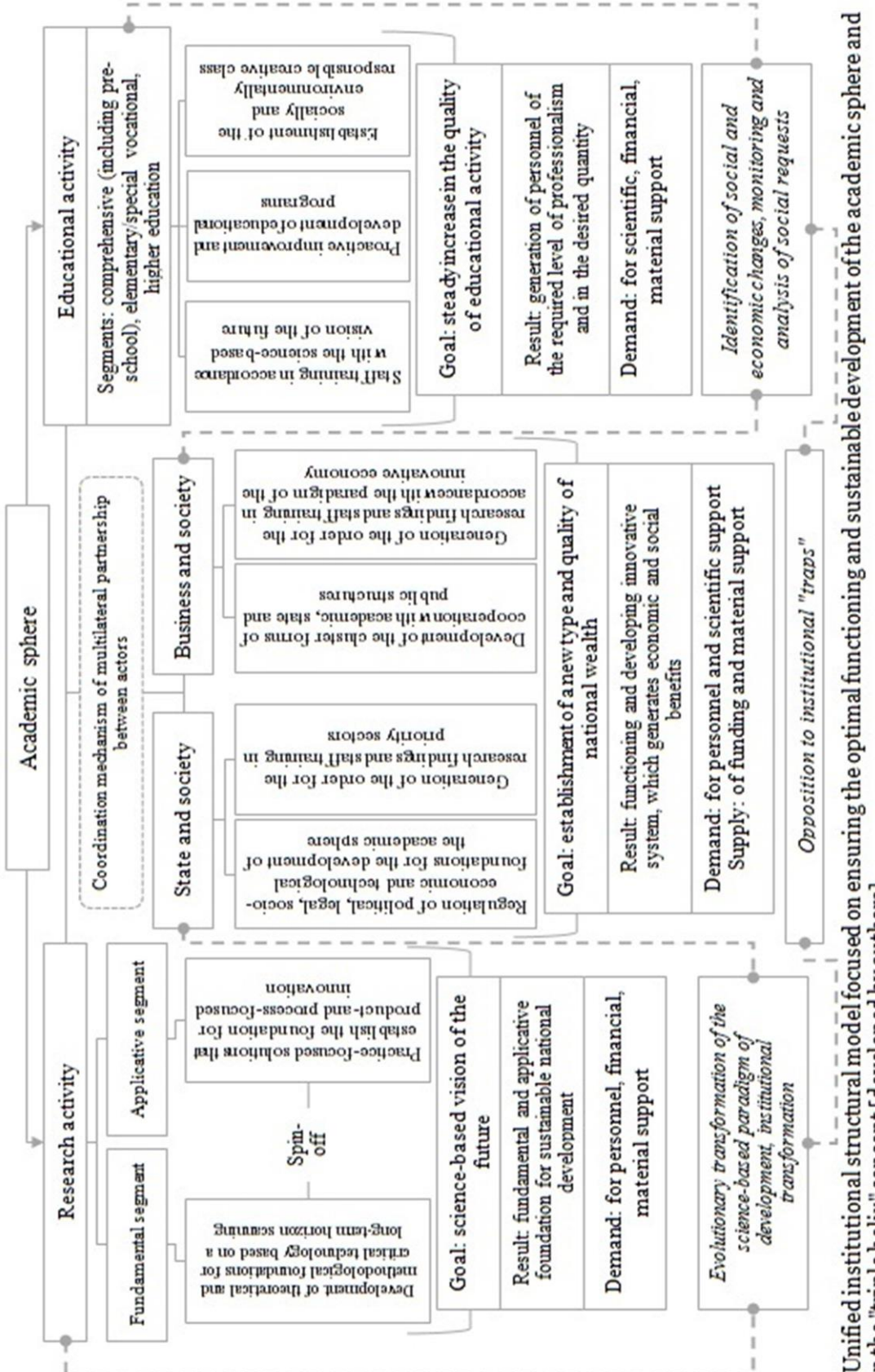

Fig. 2. Unified institutional structural model focused on ensuring the optimal functioning and sustainable development of the academic sphere and based on the "triple helix" concept [developed by authors]

The key goal of the research activity must be considered the establishment of a strategic picture of a science-based vision of the future, which will determine the generation of fundamental and applicative foundations for sustainable national development as a result. In this case, the research activity, being a major producer of scientific foundations of sustainable national development, will at the same time be a recipient of personnel, financial and material resources.

Educational activity incorporates three main segments: comprehensive (including pre-school), elementary and special vocational, and higher education. At the same time, the following main tasks are solved:

1) Staff is trained on the basis of the science-based vision of the future, established in the course of solution of the tasks of the research activity;

2) Transition is carried out from the reactive to the proactive improvement and development of educational programs that meet the scientific, state, social and economic requests in the context of ensuring sustainable development;

3) Creative class is established, which will form the political, economic and social elite, while the core competencies in this class will be coordinated with the context of environmental and social responsibility within the framework of sustainable national development.

The key goal of the educational activity is steady and constant improvement of its quality, which is expressed in the obtained result: personnel entering the free labor market are described by the required professionalism and in the necessary quantity. The educational activity, being one of the producers of the socially significant benefit is also a recipient of the scientific, financial and material support. The state, business and society represent a sector that absorbs scientific and educational results. However, the state solves the following tasks at the same time and without separation from the society:

1) Regulation of the political, legal, socio-economic and technological foundations for the development of the national academic sphere;

2) Generation of the state order for the results of research and staff training in the priority (strategically important) actors that define the long-term national interests.

Business also solves a number of specific tasks without separation from the society, the most important in the aspect of the topic of this article being:

1) Tasks of development of the cluster forms of interaction with all the actors integrated into the institutional environment of the academic sphere (with the state and social, civil and other structures);

2) Tasks of generation of the socio-economic order for the results of research, as well as staff that will be authentic to the paradigm of innovation (cognitive) economy.

Accordingly, the establishment of a new type of national wealth with high intellectual component necessary to ensure the sustainable and safe national development should be considered the key goal of the state, business and society. Establishment of the national system that will generate both economic and social benefits can be considered a result here. The state, business and society, being a cumulative producer of all kinds of benefits, including those required for financial and material support of the academic sphere, are the main recipient of the staff and scientific support.

Besides, interaction between business, society and educational structures allows to timely identify social and economic changes, including latent. This forms an information and analytical base for the future institutional transformations. The state, society and research structures, in their turn, ensure the evolutionary transformation of the scientific paradigm of the national development and carry out institutional transformations on the basis of this information and analytical base. Active interaction between all actors integrated into institutional environment of the academic sphere, aside from obtaining direct and indirect socio-economic effects, also opposes to the establishment of institutional traps (corruption, shadow economy, "gray" educational schemes, ideologization of science and education).

6. Conclusions

We have made an attempt to systematically interpret the perspectives and areas of the institutionalization of the Russian academic sphere as part of the presented paper. Based on the analysis of economic and statistical data and empirical research, the findings were obtained that

both Soviet and Russian academic spheres were described (and, of course, are described now) by the structural imbalance. This causes the combination of obvious problems:

- Low intellectual and human capacity of the national socio-economic development;
- Atomization of actors who must actively interact in the institutional environment of the Russian academic sphere;
- Imbalance of the state and socio-economic order for the results of both scientific and educational activities;
- Infrastructural underdevelopment and insufficient material and financial support of the research and educational activities.

Besides, a range of interrelated problems can be specified: from inefficient labor market to the low innovative and venture activity of the entrepreneurship and corporate structures. This has predetermined the need to establish a unified institutional structural model of development of the Russian academic sphere, where the list of strategic goals, tasks and results is defined for each actor (state, business, research and educational structures); these tasks must be solved by each of the above actors.

Undoubtedly, the proposed institutional structural model requires further work in creation of the roadmaps of the academic sphere, taking into account the current and representing institutional changes, as well as based on the science-based vision of the future of the Russian state. We will disclose the issues of roadmapping of the national academic sphere with specification of the strategic and tactical decisions in the constituent segments in the following papers on this topic.

References

Tambovtsev, 2016 – *Tambovtsev, V.L.* (2016). Teorii institutsionalnykh izmeneniy [Theories of Institutional changes]. Moscow: Prospekt, 148 p.

Alexander, Colomy, 1992 – *Alexander, J. and P. Colomy*, (1992). Neofunktsionalizm segodnya: vosstanavlivaya teoreticheskuyu traditsiyu [Neofunctionalism Today: Reconstructing a Theoretical Tradition]. Federal Educational Portal ESM (HSE). Date Views 20.12.2016 ecsocman.hse.ru/data/255/864/1217/019.ALEXANDER.pdf free.

Dudin, Ivashchenko, 2016 – *Dudin, M.N., Ivashchenko, N.P.* (2016). Razvitiye institutov "vyrashchivaniya" innovatsionnykh proyektov v kontekste stanovleniya venchurnoy ekosistemy [Development of the Institutions of "Cultivation" of Innovative Projects in the Context of the Venture Capital Ecosystem Establishment]. *MID (Modernization. Innovation. Development)*, 7 (3) (27): 70-75.

Dudin et al., 2015 – *Dudin, M.N., E.E. Frolova, N.V. Gryzunova and E.B. Shuvalova*, (2015). The Triple Helix Model as a Mechanism for Partnership between the State, Business, and the Scientific-Educational Community in the Area of Organizing National Innovation Development. *Asian Social Science*, 1 (1): 230-238.

Etzkowitz, 2010 – *Etzkowitz, H.*, (2010). Troynaya spiral': universitety-predpriyatiya-gosudarstvo: innovatsii v deystvii [The Triple Helix: University-Industry-Government Innovation in Action]. Tomsk: Publishing House of the Tomsk State University of Control Systems, pp: 237.

The Constitution, 1993 – The Constitution of the Russian Federation (adopted by the national vote on 12.12.1993) (as amended by the Laws of the Russian Federation dated 30.12.2008 No. 6-FKZ, dated 30.12.2008 No. 7-FKZ, dated 05.02.2014 No. 2-FKZ, dated 21.07.2014 No.11-FKZ).

Federal Law, 2016 – Federal Law "Ob obrazovanii v Rossiyskoy Federatsii" [About Education in the Russian Federation] dated 29.12.2012 No. 273-FZ (as amended on 03.07.2016 No. 359-FZ)

Federal Law, 2010 – Federal Law "O vnesenii izmeneniy v otdelnyye zakonodatelnyye akty Rossiyskoy Federatsii v svyazi s sovershenstvovaniyem pravovogo polozheniya gosudarstvennykh (munitsipalnykh) uchrezhdeniy" [About Amendments to Certain Legislative Acts of the Russian Federation due to Improvement of the Legal Status of the State (Municipal) Institutions"] dated 08.05.2010 No. 83-FZ (as amended on 29.12.2015 No. 406-FZ).

Decree, 2012 – Decree of the President of the Russian Federation dated December 19, 2012 No. 1666 "O Strategii gosudarstvennoy natsionalnoy politiki Rossiyskoy Federatsii na period do

2025 goda" [About the Strategy of the State National Policy of the Russian Federation for the Period Through to 2025].

Resolution, 2015 – Resolution of the Government of the Russian Federation dated May 23, 2015 No. 497 "O Federalnoy tselevoy programme razvitiya obrazovaniya na 2016–2020 gody" [About the Federal target program of development of education for 2016–2020].

Order, 2014 – Order of the Government of the Russian Federation dated April 30, 2014 No. 722-r "Ob utverzhdenii Plana meropriyatiy ("dorozhnaya karta"). "Izmeneniya v otraslyakh sotsialnoy sfery, napravlennyye na povysheniye effektivnosti obrazovaniya i nauki" [About the Approval of the Action plan ("Roadmap"). Changes in the Sectors of the Social Sphere Aimed at Improving the Efficiency of Education and Science].

2016–2017 Federal Budget – 2016–2017 Federal Budget. Ministry of Finance of the Russian Federation. Date Views 20.12.2016 minfin.ru/ru/perfomance/budget/federal_budget/budj_rosp/ free.

Kleiner, 2004 – *Kleiner, G.B.* (2004). Evolyutsiya institutsionalnykh sistem [Evolution of Institutional Systems]. Moscow: Publishing House "Nauka", 240 p.

Bessolitsyn, 2015 – *Bessolitsyn, A.A.* (2015). Gosudarstvo i stanovleniye sistemy kommercheskogo obrazovaniya v Rossii na rubezhe XIX–XX vv. [The State and the Establishment of the System of Commercial Education in Russia at the Turn of XX Century]. Moscow: RAS Institute of Russian History, 226 p.

Zhukova, 2011 – *Zhukova, V.F.* (2011). Globalizatsiya i integratsiya institutov obrazovaniya kak imperativy "otkrytogo obrazovaniya" [Globalization and Integration of Educational Institutions as the Imperatives of "Open Education"]. Moscow: Science-Technology-Translation, 228 p.

Bringle, Hatcher, 2000 – *Bringle, R.G., Hatcher, J.A.* (2000). Institutionalization of Service Learning in Higher Education. *The Journal of Higher Education*, 71 (3): 273-290.

Gordon et al., 2005 – *Gordon, E.W., B.L. Bridglall and S.M. Aundra,* (2005). Supplementary Education: The Hidden Curriculum of High Academic Achievement. New York-Toronto: Rowman & Littlefield Publishing, 357 p.

Quinn, 1992 – *Quinn, J.B.*, (1992). Intelligent Enterprise: A Knowledge and Service Based Paradigm for Industry. New York: The Free Press, 400 p.

Nonaka, Takeuchi, 1995 – *Nonaka, I. and H. Takeuchi*, (1995). The Knowledge – Creating Company. New York: Oxford University Press, 384 p.

Abalkin, 2002 – Abalkin, L.I. (2002). Rossiya: poisk samoopredeleniya [Russia: Seeking for Self-identification]. Moscow: Nauka, 424 p.

Lewis and Lee, 2015 – *Lewis, B. and S. Lee*, (2015). The Cognitive Enterprise. Florida: Meghan-Kiffer Press Tampa, 212 p.

Traynev, 2014 – *Traynev, I.V.* (2014). Upravleniye razvitiyem informatsionnykh pedagogicheskikh proyektov v postindustrialnom obshchestve [Managing the Development of Information Pedagogical Projects in Post-industrial Society]. Moscow: Dashkov & Co, 226 p.

Modern, 2014 – Sovremennaya obrazovatel'naya sreda i innovatsionnoye razvitiye kompaniy v ekonomike znaniy [Modern Educational Environment and Innovative Development of Companies in the Knowledge Economy], 2014. Edt., E. Yakhontova. Moscow: Publishing house "Delo" (RANEPA), 312 p.

Sabato, 1979 – *Sabato, J.,* (1979). Technology and the Productive Structure. Mexico City: Instituto Latinoamericano de Estudios Transnacionales, 60 p.

Lundvall, 1992 – *Lundvall, B.-A.* (1992). National Systems of Innovation: Towards a theory of innovation and interactive learning. London: Printer Publisher, 404 p.

Nelson, 1993 – *Nelson, R.* (1993). National Innovation Systems: a comparative analysis. Oxford: Oxford University Press, 560 p.

Population. Education, 2016 – Naseleniye. Obrazovaniye (2016) [Population. Education (2016)]. Federal State Statistics Service. Date Views 20.12.2016 www.gks.ru/wps/wcm/connect /rosstat_main/rosstat/ru/statistics/population/education/ free.

Statistical yearbook, 2013 – Statisticheskiy sbornik: naseleniye Rossii [Statistical yearbook: population of Russia], 2013. Moscow: Publishing house SU HSE, 530 p.

Geleta, 2014 – *Geleta, I.V.* (2014). Zanyatost naseleniya i rynok truda: problemy analiza i otsenki [Employment of the Population and the Labor Market: Issues of Analysis and Assessment]. *Metropolis Management*, 1, 100-104.

Toksanbaeva, 2013 – *Toksanbaeva, M.* (2013). Struktura rossiyskoy zanyatosti: problemy, otsenki [Structure of the Russian Employment: Issues, Assessments]. *Man and Labor*, 1: 10-14.

Amonashvili, 2008 – *Amonashvili, Sh.* (2008). Pedagogika sotrudnichestva. Gumannaya pedagogika [Pedagogy of Cooperation. Human Pedagogy]. Cultural and Educational Portal "Lomonosov.org" Date Views 20.12.2016 www.lomonosov.org/article/humane_pedagogics.htm free.

Sergeev, 2013 – *Sergeev, A.L.* (2013). Reforma obrazovaniya v Rossii: problemy i perspektivy [Education Reform in Russia: Challenges and Prospects]. Virtual Club "Essence of time". Date Views 20.12.2016 eot.su/node/14936 free.

Rubin, 2015 – *Rubin, M.* (2015). War for the Youth: How the Pro-Kremlin Camp Fought Against the Influence of the West. Information and News Portal "RBC". Date Views 20.12.2016 www.rbc.ru/politics/26/07/2015/55b50efc9a794704a0af8208 free.

Meeting, 2016 – Vstrecha s liderami partiy, proshedshikh po itogam vyborov v Gosdumu (2016) [Meeting with Leaders of Parties that Gained State Duma Seats Following Elections (2016)]. Official site of the President of Russia. Date Views 20.12.2016 kremlin.ru/events/president /news/52957 free.

Lopatin, 2008 – *Lopatin, L.N.* (2008). Kachestvo sovetskoy vuzovskoy sistemy — mify i realnost [Quality of the Soviet System of Higher Education: Myths and Reality]. *Education Issues*, 2: 186-199.

Druzhilov, 2013 – *Druzhilov, S.A.* (2013). Vuzovskaya i akademicheskaya sreda v Rossii nachala XX v. [Institutional and Academic Environment in Russia of the Early XX Century]. *Education Issues*, 2: 270-280.

Tuschling and Engemann, 2006 – *Tuschling, A. and C. Engemann*, (2006). From Education to Lifelong Learning: The emerging regime of learning in the European Union. *Education Philosophy and Theory*, 38(4): 451–469.

Thibault, 2012 – *Thibault, G.E.* (2012). Interprofessional Education in the USA: Current Activities and Future Directions. *Journal of Interprofessional Care*, 26 (6): 440-441.