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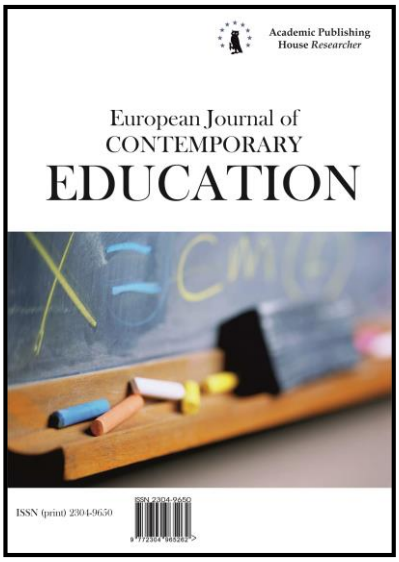

The Efficiency of Higher Education Institutions as a Basis for Forming Competent Personnel for Region Economy

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Abstract

The modern market relations open provide new opportunities of development for higher educational institutions, however the majority of universities aren't ready for effective and independent business management yet. At the turn of the 21st century many educational institutions faced such problems as scarcity of federal financing, fundamental changes in demand for educational services, decrease of the requirements to educational services and qualification of their consumers, and also lack of necessary knowledge and experience to manage universities in new conditions. The growing level of competitive struggle between educational institutions added complexity to the situation that led to a disproportion in training of personnel for regional economy. That's why the successful functioning of modern higher educational institutions should considerably depend on their fast and easily adaptation to constantly changing external environment. In our opinion the most suitable method that allows to judge on the efficiency of higher education institutions is rating assessment. Within the research we offer to create a rating of higher education institutions of Central Federal District using the integrated indicator that allows to consider the heterogeneity of the estimated criteria. The used technique allowed to determine 7 cluster groups depending on the specifics of development of higher education institution (leaders, diversifiers, accumulators of scientific research, the international orientation, accumulators of financial resources and conservatives). In article conclusions that are made in the article show that the revealed disproportion in development of higher education institutions has an influence on the processes of forming and development of professional and competent personnel for the region and as a result on the level of social and economic development.

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Keywords: regional economy, monitoring of the higher education, efficiency of higher education institutions, regional specifics of the higher education, competent personnel, social and economic development of the region.

1. Introduction

Modern information space of Russian economy is at the stage of active development, that necessitates systematic control and scientific analysis of the received results. All this reveals the relevance of monitoring researches in various spheres of social and economic life of society. And the sphere of education is not an exception, starting from 2012 annual monitoring of efficiency of higher educational institutions has been carried out in order to reveal the prospects of development of the higher school. In our opinion, the detailed analysis of results of monitoring is one of the methods to determine not only the level of scientific and educational capacity of the region, but also a basis for competent personnel training for regional economy.

The purpose of the research is to carry out an efficiency evaluation of the work of higher educational institutions of Central Federal District that are to provide highly qualified and competent personnel that should meet market requirements.

Research tasks are to study the methods of rating assessment that are used for higher education institutions, to search for new methods of ratings with use of the integrated indicator allowing to consider the heterogeneity of the criteria.

2. Materials and methods

"Action plan" of development of professional education includes a number of measures that lead to strengthening of the potential of highly skilled personnel training. One of such measures is monitoring of educational institutions approved by Russian Federation Presidential Decree of 7 May, 2012 No. 599 "About the measures in realization of federal policy in the fields of education and science" (Russian Federation). Lack of motivation to achieve competitive results among higher education institutions was one of the reasons to start monitoring the efficiency of their work.

It should be noted that the indicators in monitoring generalize a set of quantitative assessments of solvency of the higher education institutions that are used both in domestic and in foreign ratings. Among domestic rating agencies are such as, RAEX (Second annual rating), National Research University Higher Schools of Economics and RIA Rating (Monitoring of the quality), All Russia Public Organization Business Russia (Business rating), Federal education agency (FEA) (The ratings of higher), Kommersant (Rating of higher), the independent agency "Reuters" (The rating of the Russian). Among all international global academic rating agencies there are three most known: Academic Ranking of World Universities (ARWU) – the Shanghai rating (Academic Ranking); QS World University Rankings – the rating of QS (QS World); Times Higher Education World University Ranking – Thomson Reuters (THE), the rating of Times (Times Higher Education).

On the basis of the carried-out comparative analysis of the components of domestic and foreign ratings it is possible to draw an inference that the indicators in the monitoring generalize a set of quantitative assessments of solvency of higher education institutions, but don't allow to carry out an overall complex assessment.

The subject of the research is the work efficiency of higher educational institutions in the territory of Central Federal District.

Author's calculation methology of an integrated indicator of efficiency assessment of work of higher education institutions is offered for determination of private quantitative assessment of scientific and educational capacity of the region (Sezonova, 2015: 236). The data of annual monitoring of efficiency of work of higher education institutions are the basis for calculations, the data of monitoring fall within 7 groups: educational, research, international, financial and economic activities, salary of the faculty, employment of the graduates and a category of additional indicators (Information and analytical).

Each of these groups of indicators has its median values reflecting efficiency of higher education institution in this or that type of activity:

1. The indicators that refer to «Educational Activities» allow to estimate students' average grade in Unified State Examination, percentage of the first-year students (winners and prize-winners of the All-Russian Olympiads of School Students and employer-sponsored students), the bachelors and specialists, specific weight of the students taking master degree, the number of

postgraduate students calculated per 100 students, and the percentage of academic staff having degree of the candidate and doctor of science.

2. Indicators of research activities reflect the number of publications and citations of scientific works in Russian and international systems: RSCI, Web of Science/Scopus; the amount of research and development calculated per 1 member of academic staff, the proportion of funds received from IP management and the percentage of young scientists in academic staff.

3. International activities include a set of the indicators characterizing the ratio of foreign students-graduates in student body.

4. Financial and economic activities – the income of higher education institution from all sources and from revenue-producing activities calculated per one member of academic staff, the ratio of the average salary of the academic staff in higher education institution to the average salary of the region and the income of higher education institution from all sources calculated per the number of students.

5. An indicator "The salary of the faculty" provides the calculation of one of the leading indicators reflected in "action plan" – the ratio of the salary of the faculty to the average salary in the region.

6. The indicator "Employment", allows to estimate the proportion of the graduates who found employment within the calendar year following the year of graduation in total number of graduates having studied according to the main educational programs of the higher education.

7. The additional indicators take into consideration the sector profile of higher education institution. Now the following specifics of higher education institutions are taken into account: military, medical, sports, transport, creative and agricultural.

3. Research tools

Taking into consideration the foregoing it is possible to claim that within the development of scientific and educational capacity of the region there is a necessity to increase the competitiveness of Russian education in the world due to training of highly qualified personnel. All the innovations in the field of education and budget policy pursue this objective. However, the increase of financing directed to the development of education will allow to achieve desirable results only if certain purposes and ways of their achievement are set, and in particular, national universities should increase their competitiveness and at least five national higher education institutions should enter top hundred in world rating list in accordance with the "action plan".

At the same time it should be noted that each group of the criteria used in the monitoring ambiguously reflects the efficiency of higher education institutions. It is offered to weight the data of monitoring and to calculate an integrated indicator in order to balance the criteria:

$$K_{эф} = \sum_{i=1}^{n} X_i \times w_i \qquad (1)$$

where X_i – an indicator of efficiency of higher education institution, w_i – a weighting value in general set.

Collation of criteria according to their importance assumes the use of the method of pair comparisons. To get objective results of weighting 12 independent experts in the sphere of education were interviewed in order to determine the degree of importance of each criterion in the monitoring of efficiency of higher education institutions, at the same time additional indicators were not taken into consideration as the higher education institutions had different sector profiles. As a result the average values of each criterion of efficiency of higher education institution were calculated (table 1) as a basis for the method of pair comparison (David, 1978: 18) (tab. 2).

Table 1. Criteria of assessment of the efficiency of higher education institution

Criterion	Average value	Criterion	Average value
1. Educational activities - (O)	9,2	4. Financial and economic activities - (F)	6,7
2. Development and research - (H)	8,5	5. International activities - (M)	6,2
3. Salary of teaching staff – (S)	7,9	6. Employment - (T)	6,3

For pair comparison of criteria of the work of higher education institutions the system of assessment B_{ij} is used:

$$B_{ij}\begin{cases}1, \text{if the compared criteria are equivalent;}\\ 0, \text{if the criteria of the line are less than the criteria of the column;}\\ 2, \text{if the criteria of the line are greater than the criteria of the column.}\end{cases} \quad (2)$$

Table 2. Matrix of binary reference of the criteria under consideration

B_{ij}	Indicator	O	H	M	F	S	T	S_i	W_i
	O	1	2	2	2	2	2	11	0,31
	H	0	1	2	2	2	2	9	0,25
	M	0	0	1	0	0	0	1	0,03
	F	0	0	2	1	0	2	5	0,14
	S	0	0	2	2	1	2	7	0,19
	T	0	0	2	0	0	1	3	0,08
Total:								36	1,00

Thus, during steps of carried-out comparative assessment with use of expert poll, it was determined that the greatest impact on an integrated indicator of efficiency has such criteria as educational and research activities.

4. Results of a research

The tendencies of development of higher educational institutions of all the regions of the Central Federal District with the exception of Moscow and the Moscow region were analyzed in the research. The basis of selective observation was formed by higher educational institutions with:

- quantity of the executed monitoring indicators not lower than three;
- the student body at least 1000 people;
- the integrated group of specialties (major) "Economics and management".

Totally 57 higher education institutions were selected by results of the research with the exception of the branches.

The threshold value of efficiency is 248,58, received by calculation of an integrated indicator for median values of each of criteria. The received median value is applicable to most higher education institutions of the CFD with only one exception – Belgorod region. The geographical location and level of economic development of the subject of the Russian Federation where the higher education institution is located has been taken into consideration since 2015 in making the assessment of the amount of Research and Development. Threshold values for various groups of regions fluctuate from 51 to 70 thousand rubles, and the higher education institutions of Belgorod region and of Republic of Udmurtia turned out to be in one group, for example.

On the basis of the data the calculation of the corresponding integrated indicators was made, a table fragment with the received results is in table 3.

The results made it possible to group higher education institutions according to their development in education market. For building-up an interval distribution series, we applied Sterdzhess's formula (The choice, 1995: 65) that allowed to determine 7 clusters of higher education institutions using the integrated indicator:

$$n = 1 + 3{,}322 \lg N = 1 + 3{,}322 \lg 57 = 6{,}83 \approx 7\,. \quad (3)$$

The value of an equal interval is:

$$i = \frac{X_{\max} - X_{\min}}{n} = \frac{630{,}11 - 196{,}35}{7} = 61{,}96. \quad (4)$$

Positioning and group of higher education institutions by integrated criterion of assessment of efficiency are provided in the picture.

Table 3. Integrated indicator of the efficiency of higher educational institutions of Central Federal District

Higher Education Institution	Indicators, x_i						Integrated indicator, $K_{эф}$
	Educational activities, credits	Development and Research, Thousand rubles.	International activities, %	Financial and economic activities, Thousand rubles.	Salary of teaching staff, %	Employment, %	
Weight, w_i	0,31	0,25	0,03	0,14	0,19	0,08	1,0
Median value	60	51,28 – 70,1	1	1327,57	133	75	248,58
1. Belgorod National Research University	63,71	831,28	16,76	2620,28	153,69	75	630,11
2. Bryansk State Agrarian University	53,32	196,75	13,68	3269,54	184,74	70	564,56
3. Kovrov State Technical Academy n.a. V. A. Degtyarev	55,68	55,18	18,77	2096,74	153,73	90	361,57
4. Voronezh State Agricultural University	54,21	60,75	1,56	2141,12	150,57	30	362,80
5. Ivanovo State University of Chemistry and Technology	60	311,96	3,92	1868,73	163,46	75	395,39
6. Kaluga State University	63,05	54,36	2,05	1331,08	140,97	80	252,73
7. Kostroma State University n.a. N.A. Nekrasov	59,63	203,33	7,52	1433,76	145,76	85	304,76
8. Kursk State Agricultural Academy	55,64	64,98	1,04	1726,96	156,22	65	310,18
9. Lipetsk State Technical University	59,61	90,18	3,5	1637,51	140,59	80	303,49
10 Orel State Agrarian University	60,09	245,92	2,74	1926,22	171,11	75	388,37
11. Ryazan State Radio Engineering University	62,48	660,31	2,14	2006,67	157,73	85	502,21
12. Smolensk University for the Humanities	51,35	138,44	7,35	1842,16	147,75	0	336,72
13. Tambov State University n.a. G.R. Derzhavin	62,93	192,91	15,81	2079,92	142,95	75	392,56
14. Tver State University	64,5	244,63	2,87	2161,43	175,53	80	423,59
15. Tula State University	60,98	137,27	8,06	1937,57	159,2	80	361,37
16. Yaroslavl State University	71,03	251,58	0,69	1790,92	193,02	85	379,14

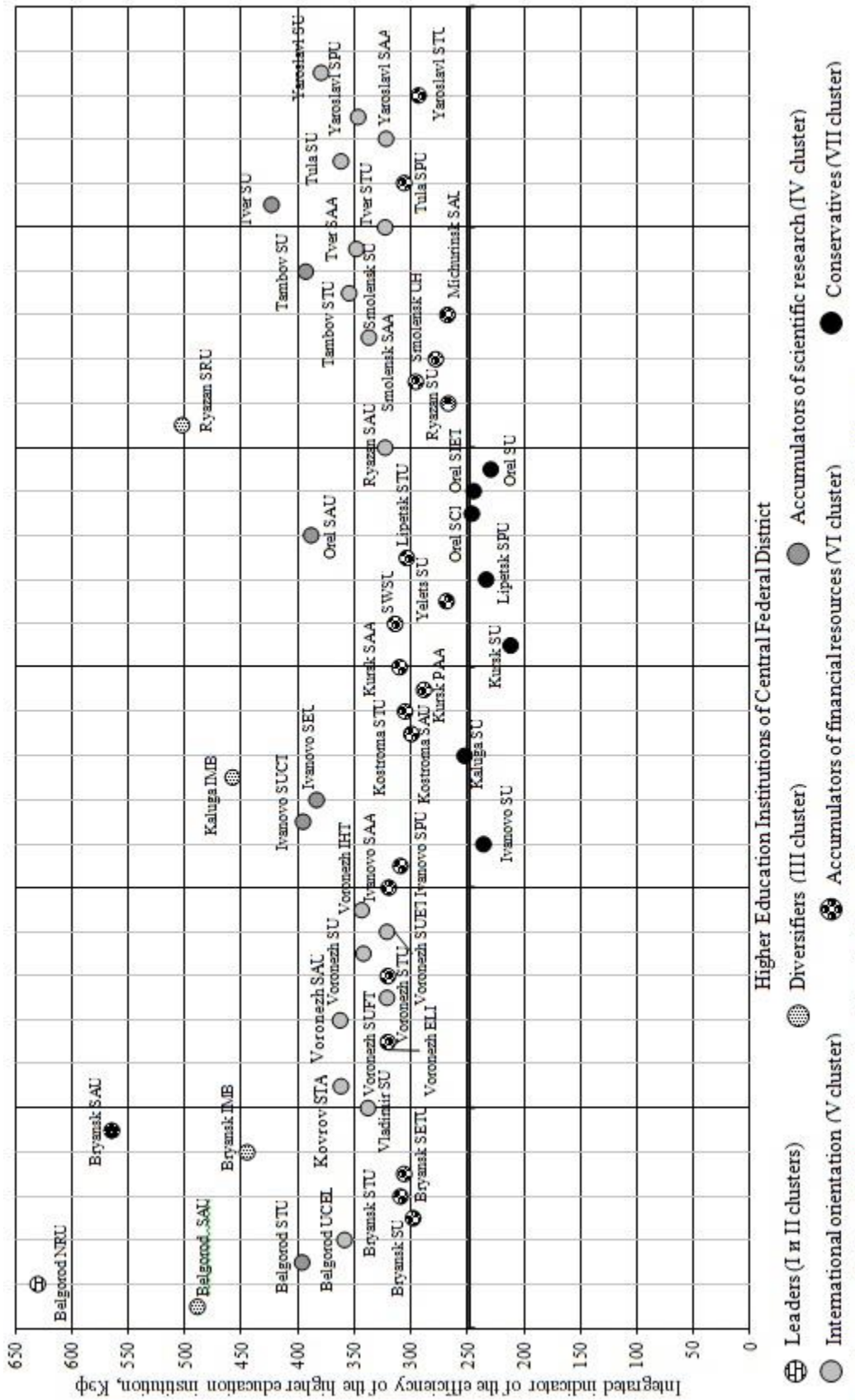

Fig. The Association of higher educational institutions of the Central Federal district in the overall indicator

Disruptive development in several activity areas corresponds to I and II clusters (Leaders), the integral index is 2,5 times higher than the threshold value. Two higher educational institutions were included in this cluster: Belgorod state national research university, Bryansk state agricultural university.

The III cluster (Diversifiers) – harmonic development of educational institutions, at the same time at least three indices exceed threshold values more than twice. This group included 4 educational institutions (The Belgorod state agricultural academy n.a. V. Ya. Gorin, Bryansk institute of management and business, Institute of management, business and technologies, Ryazan state radio engineering university). Research and development, financial and economic activities and international activities are the most developed. Value of an integral index is ranging within 506 to 568 points.

The IV cluster (Accumulators of scientific research) – variation of intensive development of higher education institution with a focus on development and research. This category includes higher education institutions with the index of research and development activities 4 times higher than the threshold value and the integral index is 1,3 times higher. This group included 6 educational institutions.

The V cluster (The international orientation) – development with the high level of international activity index, the index is on average 7 times higher than the median value. This cluster includes 16 higher educational institutions which are in the range within 320 to 382 points.

The VI cluster (Accumulators of financial resources) – the higher educational institutions ranging within 258 to 320 points are characterized by intensive development of higher education institutions with a focus on the maximizing financial results in profile activities. On average index value is 1,2 times higher than the median. 20 higher education institutions were included in this group.

The VII cluster (Conservatives) – results of development are obviously not seen, at the same time the most part of the studied indices are higher than median values that proves their efficiency. But in accordance to the calculation of an integral index seven higher educational institutions are below the median line.

5. Conclusion

It should be noted that, despite high values of an integrated indicator of efficiency of higher education institutions, the disproportion of not only regional development, but also at the level of federal districts seems to be obvious and was reflected in the previous researches. It can be detected by fluctuation of indicators of scientific and educational potential and, as a result, it has negative effect on the effective functioning of system of development of professional competences of the personnel. The point to be emphasized is that one of methods to solve the problem of disproportionate social and economic development of regions is to develop cluster economy which is determined by a number of factors, such as favorable mineral and scientific and educational base, high development of infrastructure, convenient geographical location, and also historically developed links of business entities or industries (Khodirevskaya, Sezonova, 2013a: 254).

Thus, the revealed regional disproportion of accumulating and realization of educational potential not only is closely connected with social and economic factors of the development of the regions of the Russian Federation, but also influences the processes of development of professional and competent staff (Khodirevskaya, Sezonova, 2013b: 102).

It is important to emphasize that if the regional economy has necessary resources for development and raising of living standards, then it will lead to growth of reward from the got professional education and to improvement of quality of a labor power which is shown through skill level and competence. If quality of social and economic parameters in the region is reduced, then can lead to a mismatch of processes of accumulating and realization of educational potential.

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