DISCUSSION PLATFORM

Publishing Activity of RAS Economic Institutes amid New Challenges of Science Policy

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Abstract. New challenges of science policy in Russia have determined a number of objectives which require scientific institutions to implement specific solutions aimed at improving research quality and efficiency. Since the evaluation of research results requires the use of different metrics, including bibliometrics, the main issue lies in the choice of indicators which can be used to conduct multi-analysis. The aim of this study is to implement the holistic approach to bibliometric assessment of scientific institutions and to analyze the performance of academic activity of economic institutions on the basis of the proposed criteria. The article summarizes the results of scientometric indicators monitoring, conducted at the Institute of Socio-Economic Development of Territories of the Russian Academy of Sciences. The analysis is based on a large set of publications of academic economic institutions for the period 2011–2015. The informational basis of the research includes data of the Russian Science Citation Index (RSCI). The institutions were ranked by a number of criteria: total number of publications in the RSCI and journals from the VAK list of Publications, number of citations. The author analyses the h-index value dynamics and indicators characterizing the number of publications considered as most-cited for the reference group in question. Conclusions and data obtained during analysis may be useful for studying development trends of economic science in Russia and assessing the performance of scientific organizations

based on researching the dynamics of individual publication indicators and their comparison by reference group.

Key words: science policy, publishing activity, RAS economic institutions, performance of academic activity, bibliometric indicators, citation analysis, Russian Science Citation Index.

Introduction

Current priorities of Russia's scientific and technological development have raised new challenges before the scientific community; one such challenge is to create an effective management system in the field of science, which can provide improvement of investment attractiveness of R&D, enhance their effectiveness and promote the demand for them. The Decree "On the strategy for scientific and technological development of the Russian Federation"[1] signed by the President points out that, despite the important role that Russian science continues to play in the security of the country, the current state of affairs shows that it possesses not only competitive advantages, but also several unresolved issues that hinder its scientific and technological development. In particular, it relates to a significant differentiation of the performance and effectiveness of the currently functioning several hundred scientific and educational centers that conduct research and development at the world level. Implementing the Strategy should

change the role of science and technology in the development of society, economy and the state and lead to the creation of an effective system for organizing R&D that ensure their high impact and relevance in the socio-economic sphere.

It is obvious that Russian scientific organizations face new challenges. They are expected to deal successfully with the challenges raised before modern society and our country and to offer effective responses to them. The government relies on the organizations that support and develop relations with the real sector of the economy and social sphere, demonstrate high effectiveness of research and are able to adjust the areas of their work, recognizing the responsibility before the society and the state so as in the future they could achieve fundamentally new and breakthrough results and solve major problems the country is facing.

The issue concerning the allocation of leading scientific organizations again brings to the fore the problem of evaluating their performance and the problem of increasing the indicators, including publication indicators. Scientific organizations must be prepared to fit into a modern system for monitoring and evaluating their performance efficiency and effectiveness. Despite the fact that

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[1] O Strategii nauchno-tekhnologicheskogo razvitiya Rossii: Ukaz Prezidenta RF ot 1 dekabrya 2016 g. №642 [About the Strategy for scientific and technological development of Russia: Decree of the President of the Russian Federation dated December 01, 2016 No. 642]. *Ofitsial'nyi sait Prezidenta RF* [Official website of Russian President]. Available at: http://www.kremlin.ru/acts/news/53383.

experts have not yet come to a consensus about the use of publication activity indicators for evaluating the scientific performance of scholars and research teams, scientometric parameters are used as the targets of the state policy in the field of science. The Order of the Ministry of Education and Science of the Russian Federation of March 05, 2014 No. 162 approved the procedure according to which research organizations are to submit the information about the results of their activities and the composition of this information[2]. The information on the scientific institutions subordinated

to the Federal Agency for Scientific Organizations (FANO of Russia) has already been collected. Probably, the results of the monitoring will be announced soon. According to the analysis of the parameters that assess the impact and relevance of scientific research, these parameters include bibliometric indicators, in particular, the number and cumulative citation index of publications of an organization that are indexed in Russian and international information-analytical scientific citation systems, as well as the cumulative impact factor of the journals that contain the articles of this organization. It should be noted that the mandatory data include the number and cumulative citation of the publications indexed in the Web of Science database, while data for other databases are optional. In our opinion, the use of the indicators of global citation indices does not provide a clear picture for evaluating research activity of Russian scholars, since there are not many publications by Russian scientists in international databases (as of May 2014, the share of publications of Russian researchers in scientific journals indexed in WoS amounted to 2.106%). Moreover, the comparison of simple indicators such as the number of published papers and the total number of their citations allows institutions to be ranked according to their overall scientific productivity, but these data are insufficient to identify organizations that carry out breakthrough research.

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[2] Ob utverzhdenii poryadka predstavleniya nauchnymi organizatsiyami, vypolnyayushchimi nauchno-issledovatel'skie, opytno-konstruktorskie i tekhnologicheskie raboty grazhdanskogo naznacheniya, svedenii o rezul'tatakh ikh deyatel'nosti i poryadka podtverzhdeniya ukazannykh svedenii federal'nymi organami ispolnitel'noi vlasti v tselyakh monitoringa, poryadka predostavleniya nauchnymi organizatsiyami, vypolnyayushchimi nauchno-issledovatel'skie, opytno-konstruktorskie i tekhnologicheskie raboty grazhdanskogo naznacheniya, svedenii o rezul'tatakh ikh deyatel'nosti v tselyakh otsenki, a takzhe sostava svedenii o rezul'tatakh deyatel'nosti nauchnykh organizatsii, vypolnyayushchikh nauchno-issledovatel'skie, opytno-konstruktorskie i tekhnologicheskie raboty grazhdanskogo naznacheniya, predostavlyaemykh v tselyakh monitoringa i otsenki: prikaz Ministerstva obrazovaniya i nauki Rossiiskoi Federatsii ot 5 marta 2014 g. No. 162 [About the approval of the procedure according to which scientific organizations performing research, developmental and technological works of civil designation are to submit information about the results of their activities and about the approval of the procedure for verifying this information by the federal executive authorities for the purposes of monitoring; about the approval of the procedure according to which scientific organizations performing research, developmental and technological works of civil designation are to submit information about the results of their activities for the purposes of evaluation, as well as the composition of information about the results of activities of scientific organizations performing research, developmental and technological works of civil designation provided for the purposes of monitoring and evaluation: Order of the Ministry of Education and Science of the Russian Federation dated March 05, 2014 No. 162]. *Rossiiskaya gazeta* [Russian Newspaper], 2014, May 14. Available at: https://rg.ru/2014/05/14/minobrnauki2-dok.html

Consequently, a full-fledged biblio-metric evaluation of scientific results requires the use of additional criteria.

In our opinion, a more correct approach to the measurement of the level of scientific productivity of organizations can be based on the analysis of the values of the Hirsch index (h-index) that reflect a balanced assessment of the publication activities of an organization and citation of its papers. Besides, in order to determine the percentage of higher quality articles in the total publication volume of an organization it is important for the Russian research institutes to consider the number of publications in the journals included in the List of peer-reviewed scientific publications recommended by the Higher Attestation Commission (VAK). Organizations that have a breakthrough performance can be identified with the use of the data on highly cited publications. Thus, the aim of the present work is to try and apply a comprehensive approach to the bibliometric assessment of scientific organizations and to analyze the scientific impact of economic institutes on the basis of selected indicators.

The article summarizes the results of a monitoring of scientometric indicators of scientific organizations for 2011–2015; the monitoring is conducted at the Institute of Socio-Economic Development of Territories of RAS. The reference group consists of 19 institutions, which are now subordinated to the Federal Agency for Scientific Organizations of Russia, and were formerly included in the Economics Section, Social Sciences Department (hereinafter – RAS economic institutes). The data for analyzing their publication activity and citation level of their works were taken from the Russian Science Citation Index (RSCI) developed on the basis of the Scientific Electronic Library (SEL, eLibrary.ru). The conclusions presented in the article were obtained in the analysis of a large array of publications that comprises several thousand original documents. Organizations were ranked according to several criteria: total number of publications in the RISC and in the journals on the VAK List and the number of citations. The author provides statistical data on several indicators (in particular, the h-index), the dynamics of which is not reflected in the Russian Science Citation Index. At the same time, the study covers the results of significant analytical work on identifying the highly cited publications of institutions.

The conclusions obtained in the course of the analysis can be useful to study the trends of development of economic science in Russia. In addition, the results of this study are important for the organizations themselves, because they allow them to assess their own performance not only with the help of the dynamics of their own indicators, but also by their comparison with those of other institutions in the relevant reference group.

Methodological approaches to the evaluation of research organizations based on the analysis of bibliometric indicators

Today, a variety of bibliometric indicators are used for monitoring the scientific performance of organizations. The literature on the subject describes various approaches to the analysis of the data obtained on the basis of bibliometrics, but, according to experts [8, p. 108], there are no perfect indicators. The main problem, in our opinion, consists in the definition (choice) of important indicators that can be used to make a multilateral, comprehensive assessment.

For the purposes of carrying out the monitoring of the performance of research organizations simple indicators are used most frequently, in particular, the number of published papers and the number of citations. For example, comparing these indicators over a specific period and in the same region, complemented by rationing them by the number of scientists allows us to rate organizations according to their total research productivity [5, p. 124].

With regard to the evaluation of scientific activity on the total number of publications, as you can see, even those scholars who were at the origins of scientometric studies in our country [6] emphasized that the mere number of publications cannot be considered a criterion of effectiveness of the researcher. But taking the citation rate of the publication as a measure of its usefulness, experts consider it possible to assess the performance of individual scientists and entire research teams on the basis of citation analysis [1, 2, 6]. The notions of citation as an indicator of impact and a tool for assessing scientific contribution stem from theoretical works by R. Merton. He points out that if a scientist's work goes unnoticed and is not used by other members of the scientific community, then doubts will arise as to its value [22]. Researchers consider the role of citation from different angles, noting that it somehow measures the "intellectual influence" [22, 25], "usefulness and importance of the work" [16], "credibility of the cited document" [18]. According to experts, citation can be used as a tool to measure the impact [14], which the work has on the community as a whole.

As a rule, citation indices are used for evaluating scientific contribution of a researcher, organization, or country as a whole. Earlier, the average citation level was often used for this purpose [3, p. 44]. But today, experts in the field of scientometrics are inclined to believe that average indicators do not give "a complete picture of the researched multitude of papers" and allow for "making a correct comparison of efficiency of research activity of different authors or organizations" [7, p. 2]. Therefore, in recent years, the analytic methods fundamentally departing from the definition of mean values are widely used, in particular, the calculation of "Hirsch-like" indicators [1; 5; 8; 15; 19; 21] and

methodology for defining "extreme" citation [3; 4; 8; 12; 23].

The *h*-index is essentially a measure of scientific productivity of a researcher, based on the distribution of citations of his/her work. This calculation is based on the idea of American physicist J. Hirsch, who in 2005 proposed to set the ratio of the number of a scientist's publications to the number of their citations. This ratio is called the Hirsch index or the *h*-index. When introducing this metric, J. Hirsch argued its preference to criteria such as the number of papers divided by the total number of citations, or the number of citations per paper [21]. Despite the fact that the original definition of the *h*-index focuses on the comparison of the authors' performance, this indicator can be used for assessing scientific communities. In relation to scientific institutions, as we have mentioned previously [9, p. 196], the *h*-index is calculated in the RSCI on the basis of the distribution of citations of researchers. The *h*-index h is obtained if out of the total number (Np) of papers of the staff of the institution each paper is cited at least h times, while the remaining (Np − h) papers are cited no more than h times each. For example, if the *h*-index of a scientific organization is equal to 10, it means that the database from which the data for the analysis was taken contains not less than 10 scientific works of the institute, each of which has been cited 12 times and more. We can say that the *h*-index characterizes the magnitude

and success of research and publication activities of an organization and reflects the average publication activity of its researchers.

Techniques associated with the definition of the so-called "extreme citation" [8, p. 97-100] focus on the analysis of the articles that have received abnormally low or abnormally high number of links. For the objectives of the present study the author used elements of the methodology for identifying highly cited publications. According to the traditional methodology used in the Essential Science Indicators[3] database, the highly cited papers are scientific publications, which at a fixed issuing year and topic were among the 1% of the most cited works[4]. Treating them as works of the highest quality from the point of view of international recognition of research findings by scientists from a certain country [3; 17; 20; 23; 24], experts conclude that highly cited publications can serve as a kind of indicator of the quality of the scientific system, because in many key fields of science they account for the most significant portion of the links [13]. In the analysis of highly cited articles the absolute rate is investigated, i.e. one finds out how many of such works

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[3] Essential Science Indicators is a database that comprises 22 subject areas in science and social sciences over the ten rolling years plus the current year. It is a Thomson Reuters product. The database covers only research articles and reviews.

[4] *Web of Science. Essential Science Indicators.* Available at: http://wokinfo.com/products_tools/analytical/essential-scienceindicators/

Table 1. Dynamics of the indicators of the total number of publications of RAS economic institutes in the Russian Science Citation Index (data of SEL as of November 11, 2016)

Institute	2011 units	2011 place	2012 to 2011, %	2012 units	2012 place	2013 to 2012, %	2013 units	2013 place	2014 to 2013, %	2014 units	2014 place	2015 to 2014, %	2015 units	2015 place	Total for 5 years units	Total for 5 years place
Institute of Economics, Ural Branch of RAS	569	1	112.1	638	1	106.6	680	1	120.1	817	1	109.5	895	1	3599	1
RAS Institute of Economics	528	2	105.9	559	2	113.1	632	2	97.8	618	4	62.3	385	6	2722	2
Institute of Economics and Industrial Engineering, Siberian Branch of RAS	495	3	92.5	458	3	109.4	501	3	125.7	630	2	83.5	526	3	2610	3
RAS Institute of Socio-Economic Development of Territories	319	6	109.7	350	5	139.4	488	4	104.1	508	5	119.5	607	2	2272	4
RAS Central Economics and Mathematics Institute	379	4	106.3	403	4	97.3	392	5	159.9	627	3	74.0	464	4	2265	5
RAS Institute of Economic Forecasting	321	5	87.5	281	7	107.1	301	7	113.3	341	8	110.3	376	7	1620	6
Luzin Institute for Economic Studies, Kola Scientific Center of RAS	285	7	102.5	292	6	109.6	320	6	107.8	345	7	104.6	361	8	1603	7
Institute for Social and Economic Research, Ufa Scientific Center of RAS	218	8	106.0	231	8	92.2	213	8-9	175.1	373	6	106.2	396	5	1431	8
RAS Market Economy Institute	132	11	103.0	136	10	124.3	169	10	137.3	232	9	103.0	239	10	908	10
Institute of Social and Economic Research, Dagestan Scientific Center of RAS	140	10	90.0	126	11	121.4	153	11	141.2	216	10	58.8	127	12	762	11
Economic Research Institute of the Far Eastern Branch of RAS	120	12	81.7	98	12	105.1	103	12	164.1	169	12	87.0	147	11	637	12
Institute for Social and Economic Research and Humanities, Southern Scientific Center of RAS	186	9	83.3	155	9	137.4	213	8-9	97.2	207	11	119.8	248	9	1009	9
RAS Institute of Socio-Economic Studies of Population	72	15	116.7	84	14	117.9	99	13	103.0	102	16	105.9	108	14	465	14
RAS Institute of Agrarian Problems	87	14	101.1	88	13	69.3	61	15	186.9	114	14	96.5	110	13	460	15
RAS Institute for Regional Economic Studies	89	13	91.0	81	15	112.3	91	14	142.9	130	13	76.2	99	15	490	13
Institute for Socio-Economic and Energy Problems of the North, Komi Scientific Center, Ural Branch of RAS	66	16	62.1	41	17	124.4	51	16	202.0	103	15	84.5	87	16	348	16
Institute of Economics, Karelian Research Center of RAS	28	18	203.6	57	16	78.9	45	17	140.0	63	17	88.9	56	17	249	17
Sochi Research Center of RAS	16	19	162.5	26	18	119.2	31	18	103.2	32	18	106.3	34	18	139	18
Saint Petersburg Institute for Economics and Mathematics, RAS	29	17	55.2	16	19	56.3	9	19	111.1	10	19	100.0	10	19	74	19
TOTAL	4079		101.0	4120		110.5	4552		123.8	5637		93.6	5275		23663	

have been published by a scientist or organization. The analysis is performed at some fixed moment and covers a large array of publications so as to avoid dependence on "emissions". The results are important because they determine the value of the work for the science at the highest level [8, p. 98-99].

In our view, to characterize the performance of research organizations it is important to perform a full-fledged bibliometric evaluation, which involves the combination of several techniques for collecting and analyzing the indicators. For the purposes of the study presented in the paper we used a comprehensive approach. The data obtained in the study of standard indicators such as the total number of publications and citations are supplemented with conclusions on the assessment of the dynamics of values of the *h*-index of scientific institutions and the analysis of indicators of highly cited publications. The analysis allowed us to characterize the dynamics of publication activity of RAS economic institutes, and to assess the importance of their scientific performance results.

Publication activity of RAS economic institutes in 2011—2015

The total number of publications of RAS economic institutes for 2011—2015 indexed in the RSCI amounted to more than 23.5 thousand, which is 9.5 thousand more than in the previous five-year period; the growth was 169% (in 2010—2014 there were 14 thousand publications

[10, p. 237]). In this amount, the share of the top five institutions accounts for more than half of the publications — 13.5 thousand (57%): Institute of Economics of the Ural Branch of RAS — 15.2%, RAS Institute of Economics — 11.5%, Institute of Economics and Industrial Engineering of the Siberian Branch of RAS — 11.0%, RAS Institute of Socio-Economic Development of Territories — 9.6%, RAS Central Economics and Mathematics Institute — 9.6%. Dynamics of the indicators of the total number of publications of RAS economic institutes is presented in *Table 1* compiled with the use of RSCI data as of November 11, 2016. The institutes are ranked according to the total number of publications during the period under consideration.

As we can see, the peak of publication activity of the institutes falls on 2014 when the average growth rate of the total number of publications amounted to 123.8%. Some institutes have increased the number of publications in 1.5—2 times (Central Economics and Mathematics Institute — in 1.6 times; Economic Research Institute of the Far Eastern Branch of RAS — in 1.6 times; Institute for Social and Economic Research, Ufa Scientific Center of RAS — in 1.8 times; RAS Institute of Agrarian Problems — in 1.9 times; Institute of Socio-Economic and Energy Problems of the North Komi Science Center, Ural Branch of RAS — in 2 times). In our view, the enhancement of publication activity is partly due to the

adoption in early 2014 of a new structure of information on the results of activity of scientific organizations and the order of their submission for the purposes of monitoring (Order No. 162 of the Ministry of Education and Science of the Russian Federation dated March 05, 2014[5]). As part of the information, the indicators for evaluating the performance of scientific organizations were established, in particular, the indicators to assess the impact and relevance of scientific research, including the number and cumulative citation of the publications indexed in Russian and international information-analytical systems for scientific citing. A detailed analysis of the results of activities of scientific organizations, calculated according to information-analytical systems of scientific citation was provided earlier [10].

Returning to the analysis of the growth rate of the number of publications of economic institutes, we should point out that six organizations showed a positive dynamics throughout the whole five-year period (2011–2015) *(Fig. 1)*. It is obvious that a planned increase in publication

indicators may prove the systemic efforts undertaken by the institutions in this direction.

For a more detailed assessment of publication activity of scientific organizations, in our opinion, it is necessary to consider additional indicators with which it is possible to analyze the dynamics of publications with respect to editions of different types. Unfortunately, the current data presented in the Russian Science Citation Index and reflecting the number of articles published per year in the journals indexed in Web of Science Core Collection and in Scopus may not be used for analysis. On the one hand, they do not display all the journals in which the institutes publish their papers, but only those descriptions which are contained in the RSCI, and, on the other hand, the system will mark as indexed all the articles from the publications that have been recently included in these databases plus the archives over the years that are not indexed there. All this prevents us from identifying the actual volume of publications in the journals covered in WoS or Scopus on the basis of RISC data alone.

Speaking about the number of publications in different types of scientific editions in relation to the Russian realities, we should pay special attention to the dynamics of the number of articles published by the institutes in the journals included in the List of peer-reviewed scientific editions authorized to publish

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[5] *Prikaz Ministerstva obrazovaniya i nauki Rossiiskoi Federatsii ot 5 marta 2014 g. № 162. Prilozhenie 3 "Sostav svedenii o rezul'tatakh deyatel'nosti nauchnykh organizatsii, vypolnyayushchikh nauchno-issledovatel'skie, opytno-konstruktorskie i tekhnologicheskie raboty grazhdanskogo naznacheniya, predstavlyaemykh v tselyakh monitoringa i otsenki"* [Order of the Ministry of Education and Science of the Russian Federation of 5 March 2014 No. 162. Annex 3 "Composition of the information about the results of activities of scientific organizations performing research, developmental and technological works of civil designation submitted for the purposes of monitoring and evaluation"]. Available at: http://www.rg.ru/2014/05/14/minobrnauki2-dok.html.

Figure 1. Growth rate of the number of publications of RAS economic institutes in the Russian Science Citation Index, % (data of SEL as of November 11, 2016)
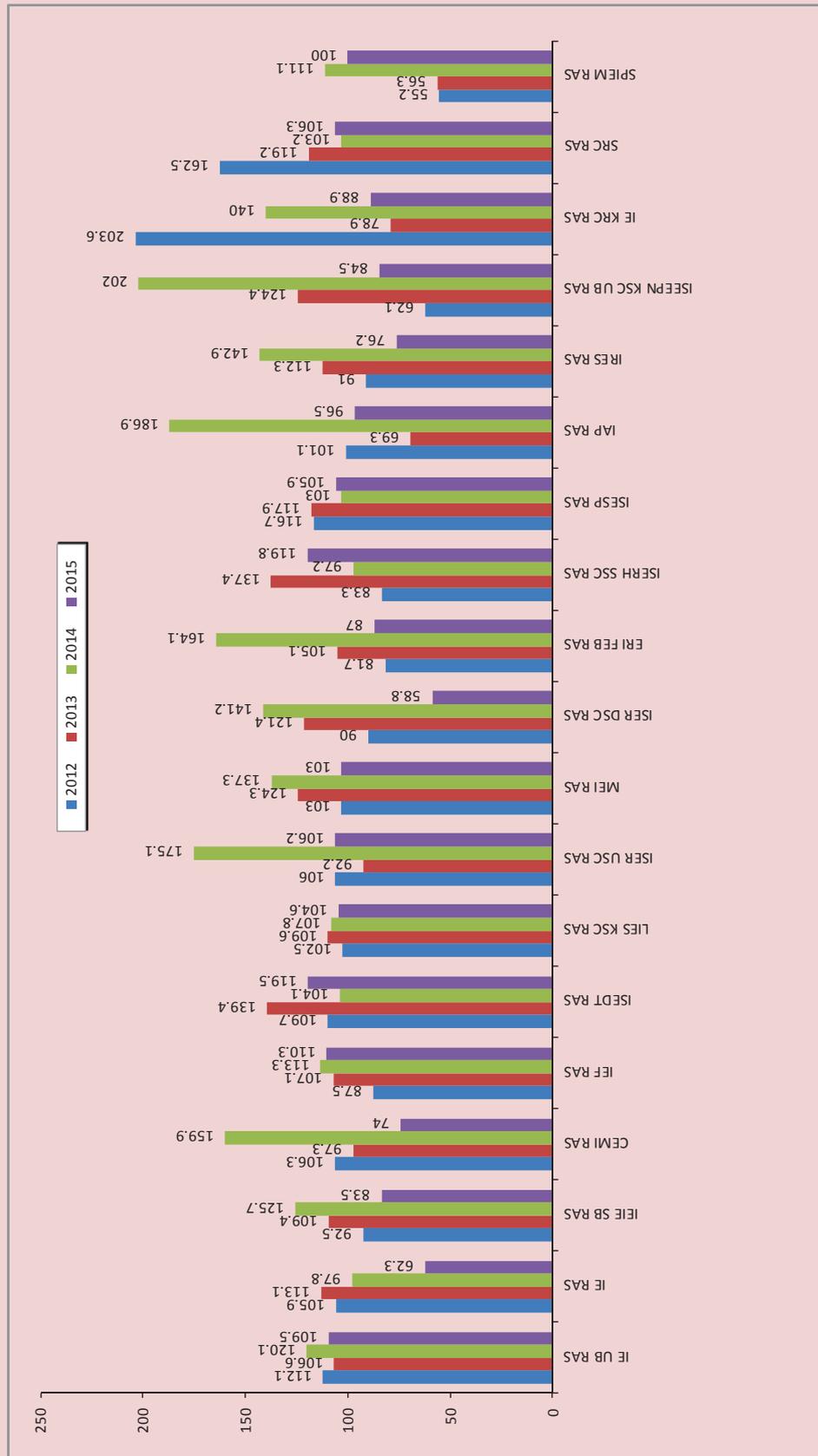
main research findings of candidate's and doctor's dissertations (hereinafter — the VAK List)[6]. Traditionally it is believed that such editions guarantee that the level of materials published in them is high. Consequently, the number of "VAK" publications can be considered as a criterion for identifying the proportion of articles of a higher quality in the total volume of publications of an organization.

On the basis of information on the number of articles published in VAK List editions by economic institutes of the Russian Academy of Sciences (presented in *Tab. 2)*, we have found out that the proportion of their publications in the selected editions is 50% of the total amount. The dynamics of indicators on individual organizations is uneven, but for the period from 2011 to 2014 in general it is possible to conclude that there is an annual increase in the number of publications under consideration. However, in 2015, this number decreased almost twofold. The overall decline is due to a substantial reduction in the number of papers published in VAK journals by several institutes. The causes of this decline require independent consideration. In our opinion, it can be caused by a decrease in the volume of research in connection with the reform of the academic system, and by the reorientation of the staff of

these institutions on the publication of important results of their research in foreign journals.

Citation analysis

In order to carry out a qualitative estimate of publication activities of RAS economic institutes of the reference group, we used the citation index, which is understood as the amount of links distributed by years to the papers executed in the relevant scientific field.

Table 3 shows the ranking of institutes by the frequency of citation of their works. The table shows that the total number of citations of scientific publications of RAS economic institutes in the RSCI in 2011—2015 amounted to about 140 thousand, about half of them (more than 67 thousand) fall on three organizations: RAS Central Economics and Mathematics Institute (27.4 thousand), RAS Institute for Economic Forecasting (22 thousand) and RAS Institute of Economics (17.8 thousand). The results of the analysis of the average annual growth rate of the number of citations show that 13 out of the 19 organizations have a positive trend on this indicator throughout the whole five-year period (2011—2015). The total average annual increase in the number of citations ranged from 15 to 28%. *Figure 2* presents the data on the organizations in which the average growth rate of the number of citations over the five-year period exceeded 150%.

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[6] The list of peer-reviewed scientific editions that are not covered in international abstract databases and citation indices and that are authorized to publish main research findings of candidate's and doctor's dissertations (as of April 19, 2016). Available at: http://vak.ed.gov.ru/87

Table 2. Dynamics of the indicators of the number of articles of RAS economic institutes in the journals included in the List of peer-reviewed scientific editions authorized to publish main research findings of candidate's and doctor's dissertations (data of SEL as of November 11, 2016)

Institute	2011 units	2011 place	2012 units	2012 place	2012 to 2011, %	2013 units	2013 place	2013 to 2012, %	2014 units	2014 place	2014 to 2013, %	2015 units	2015 place	2015 to 2014, %	Total for 5 years units	Total for 5 years place
RAS Central Economics and Mathematics Institute	178	4	183	3	102.8	206	3	112.6	216	3	104.9	230	2	106.5	2813	1
Institute of Economics, Ural Branch of RAS	301	1	349	1	115.9	353	1	101.1	366	1	103.7	330	1	90.2	1699	2
RAS Institute of Economics	275	2	286	2	104.0	350	2	122.4	326	2	93.1	187	4	57.4	1424	3
Institute of Economics and Industrial Engineering, Siberian Branch of RAS	174	5	173	5	99.4	192	4	111.0	206	4	107.3	205	3	99.5	950	4
RAS Institute of Economic Forecasting	202	3	166	6	82.2	178	5	107.2	166	5	93.3	184	5	110.8	896	5
RAS Institute of Socio-Economic Development of Territories	109	6	176	4	161.5	164	6	93.2	157	6	95.7	182	6	115.9	788	6
Luzin Institute for Economic Studies, Kola Scientific Center of RAS	83	7	121	7	145.8	117	7	96.7	103	8	88.0	128	7	124.3	552	7
RAS Market Economy Institute	59	10	77	8	130.5	103	8	133.8	122	7	118.4	90	8	73.8	451	8
Institute for Social and Economic Research, Ufa Scientific Center of RAS	40	12	73	9-10	182.5	72	10	98.6	74	10	102.8	87	9	117.6	346	9
Economic Research Institute of the Far Eastern Branch of RAS	58	11	73	9-10	125.9	76	9	104.1	75	9	98.7	59	10-11	78.7	341	10
Institute of Social and Economic Research, Dagestan Scientific Center of RAS	77	8	67	12	87.0	48	13	71.6	62	12	129.2	56	12	90.3	310	11
Institute for Social and Economic Research and Humanities, Southern Scientific Center of RAS	68	9	60	13	88.2	71	11-12	118.3	65	11	91.5	35	13-14	53.8	299	12
RAS Institute of Socio-Economic Studies of Population	34	13	68	11	200.0	71	11-12	104.4	55	13	77.5	59	10-11	107.3	287	13
RAS Institute for Regional Economic Studies	30	14-15	36	15	120.0	37	14	102.8	49	14	132.4	35	13-14	71.4	187	14
Institute for Socio-Economic and Energy Problems of the North, Komi Scientific Center, Ural Branch of RAS	30	14-15	29	16	96.7	36	15	124.1	28	16	77.8	32	15	114.3	155	15
Institute of Economics, Karelian Research Center of RAS	21	17	46	14	219.0	28	16	60.9	30	15	107.1	21	16	70.0	146	16
RAS Institute of Agrarian Problems	23	16	17	17	73.9	12	118	70.6	15	17	125.0	17	18	113.3	84	17
Sochi Research Center of RAS	2	19	5	19	250.0	16	17	320.0	13	18	81.3	19	17	146.2	55	18
Saint Petersburg Institute for Economics and Mathematics, RAS	15	18	7	18	46.7	4	19	57.1	5	19	125.0	6	19	120.0	37	19
TOTAL	1779		2012			2134			3933			1962			11820	

Table 3. Dynamics of the indicators showing the total number of citations of RAS economic institutes in the Russian Science Citation (data of SEL as of November 11, 2016)

Institute	2011 units	2011 place	2012 units	2012 place	2012 to 2011, %	2013 units	2013 place	2013 to 2012, %	2014 units	2014 place	2014 to 2013, %	2015 units	2015 place	2015 to 2014, %	For 5 years units	For 5 years place
RAS Central Economics and Mathematics Institute	4482	1	4992	1	111.4	5427	1	108.7	6342	1	116.9	6114	1	96.4	27357	1
RAS Institute of Economic Forecasting	3742	2	4127	2	110.3	4035	2	97.8	4570	2	113.3	5542	2	121.3	22016	2
RAS Institute of Economics	2758	4	2827	4	102.5	3329	3	117.8	4358	3	130.9	4507	3	103.4	17779	3
Institute of Economics and Industrial Engineering, Siberian Branch of RAS	2800	3	2830	3	101.1	3031	4	107.1	3785	4	124.9	4068	5	107.5	16514	4
Institute of Economics, Ural Branch of RAS	1540	5	2077	5	134.9	2586	5	124.5	3466	5	134.0	4502	4	129.9	14171	5
RAS Market Economy Institute	974	6	1546	6	158.7	2169	6	140.3	2392	6	110.3	2776	6	116.1	9884	6
RAS Institute of Socio-Economic Development of Territories	470	9	787	7	167.4	1271	7	161.5	1674	7	131.7	2561	7	153.0	6763	7
RAS Institute of Socio-Economic Studies of Population	553	7	581	9	105.1	627	9	107.9	723	12	115.3	1288	11	178.1	3772	10
Institute of Social and Economic Research, Dagestan Scientific Center of RAS	270	10	354	11	131.1	556	11	157.1	1236	8	222.3	2118	8	171.4	4534	8
Luzin Institute for Economic Studies, Kola Scientific Center of RAS	268	11	405	10	151.1	706	8	174.3	1030	9	145.9	1477	10	143.4	3886	9
Economic Research Institute of the Far Eastern Branch of RAS	485	8	591	8	121.9	575	10	97.3	812	10	141.2	1020	12	125.6	3483	12
Institute for Social and Economic Research, Ufa Scientific Center of RAS	220	12	323	12	146.8	372	12	115.2	813	11	218.5	1885	9	231.9	3613	11
Institute for Social and Economic Research and Humanities, Southern Scientific Center of RAS	111	14	115	14	103.6	273	13	237.4	527	13	193.0	655	13	124.3	1681	13
RAS Institute for Regional Economic Studies	87	16	133	13	152.9	151	14	113.5	318	14	210.6	569	14	178.9	1258	14
Institute for Socio-Economic and Energy Problems of the North, Komi Scientific Center, Ural Branch of RAS	90	15	102	16	113.3	141	16	138.2	278	15	197.2	359	15	129.1	970	15
RAS Institute of Agrarian Problems	123	13	106	15	86.2	143	15	134.9	184	17	128.7	209	17	113.6	765	16
Institute of Economics, Karelian Research Center of RAS	42	18	64	18	152.4	93	17	145.3	192	16	206.5	280	16	145.8	671	17
Saint Petersburg Institute for Economics and Mathematics, RAS	75	17	76	17	101.3	73	18	96.1	103	18	141.1	115	18	111.7	442	18
Sochi Research Center of RAS	27	19	10	19	37.0	46	19	460.0	51	19	110.9	54	19	105.9	188	19
TOTAL	19117		22046		115.3	25604		116.1	32854		128.3	40099		122.1	139747	

Figure 2. Growth rate of the number of citations of RAS economic institutes in the Russian
Science Citation Index, % (data of SEL as of November 11, 2016)
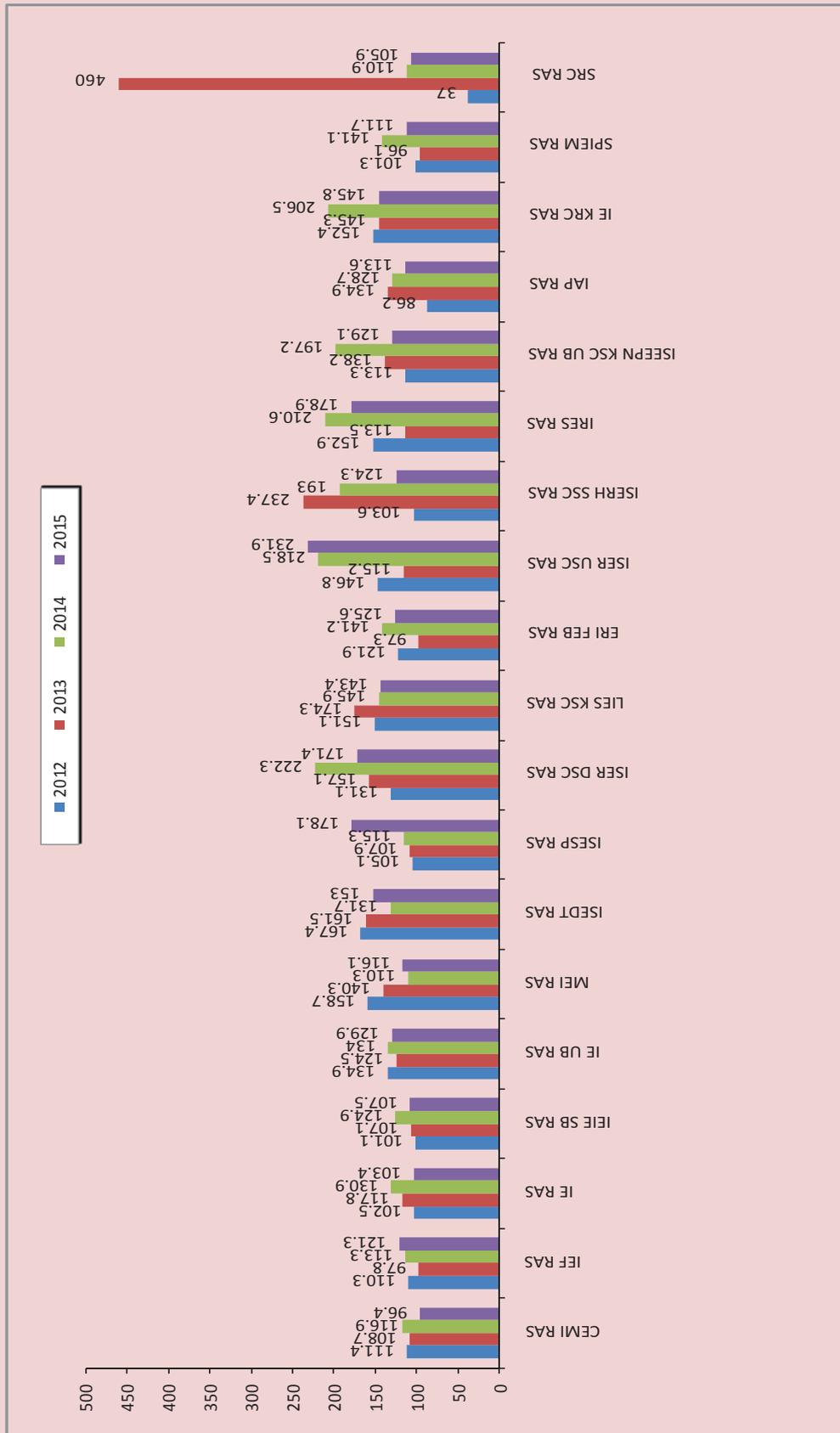
Judging by the data *(Fig. 3)*, the total number of publications of the institutions during the study period increased by 30%, while the number of citations of all the works increased twofold: from 19.1 thousand to 40.1 thousand, respectively. Dynamics of citation metrics reflecting "the impact of scientific papers on the scientific community" [2, p. 43] is an indirect evidence of increasing importance of the publications of RAS economic institutes for scientific discipline.

A comprehensive assessment of the scientific contribution and performance of organizations based on the simultaneous analysis of the number of publications and their citation can be built by applying the technique for calculating the *h*-index. We decided against determining the mean citation values, since the averaging can produce quite distorted results caused by the so-called "emissions", i.e. publications that have received a lot of links.

The results of the study of the dynamics of the values of the Hirsch index for RAS economic institutes are shown in *Table 4.* The feature of the data presented lies in the fact that their dynamics is not reflected in the RSCI. Here the results of a four-year monitoring of scientometric indicators are summarized, the monitoring is held at the Institute of Socio-Economic Development of Territories of RAS. All the values are given for the end of the selected year, the two indicators are presented for the current period: for the beginning and the end of 2016.

Figure 3. Dynamics of the indicators of the total numbers of publications and citations of RAS economic institutes in the Russian Science Citation Index, % (data of SEL as of November 11, 2016)
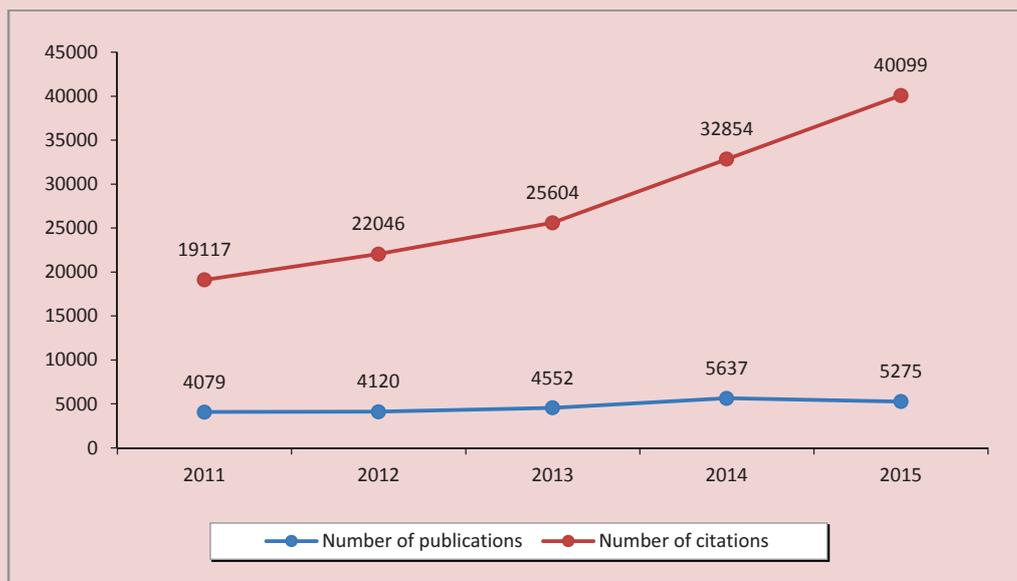
Table 4. Dynamics of the h-index* of RAS economic institutes in the Russian
Science Citation Index (data of SEL as of November 11, 2016)

№	Name of institution	2013	2014	2015	2016 (February)	2016 (November)	2016 to 2013
1	RAS Central Economics and Mathematics Institute	23	48	67	77	98	in 4.3 times
2	RAS Institute of Economic Forecasting	22	28	37	40	87	in 4 times
3	Institute of Economics and Industrial Engineering, Siberian Branch of RAS	21	31	46	51	64	in 3 times
4	RAS Institute of Economics	23	32	50	52	63	in 2.7 times
5	RAS Market Economy Institute	12	35	49	51	58	in 4.8 times
6	Institute of Economics, Ural Branch of RAS	15	21	32	35	43	in 2.9 times
7	RAS Institute of Socio-Economic Studies of Population	16	21	29	30	36	in 2.3 times
8	RAS Institute of Socio-Economic Development of Territories	12	14	25	28	35	in 2.9 times
9	Economic Research Institute of the Far Eastern Branch of RAS	10	14	21	25	34	in 3.4 times
10	Institute of Social and Economic Research, Dagestan Scientific Center of RAS	4	10	21	24	30	in 7.5 times
11	Institute for Social and Economic Research, Ufa Scientific Center of RAS	4	9	18	19	28	in 7 times
12	Luzin Institute for Economic Studies, Kola Scientific Center of RAS	10	12	18	21	27	in 2.7 times
13	Institute for Socio-Economic and Energy Problems of the North, Komi Scientific Center, Ural Branch of RAS	6	9	12	13	22	in 3.7 times
14	Institute for Social and Economic Research and Humanities, Southern Scientific Center of RAS	3	7	14	15	20	in 6.7 times
15	RAS Institute for Regional Economic Studies	6	8	12	13	17	in 2.8 times
16	RAS Institute of Agrarian Problems	5	9	12	13	14	in 2.8 times
17	Institute of Economics, Karelian Research Center of RAS	4	8	11	11	14	in 3.5 times
18	Saint Petersburg Institute for Economics and Mathematics, RAS	7	7	9	9	10	in 1.4 times
19	Sochi Research Center of RAS	4	5	6	6	7	in 1.8 times

* The *h*-index is calculated on the basis of the distribution of citations of the publications of the organization and has a value N, if an organization has N articles, each of which was cited at least N times, and the rest of its articles are cited no more than N times. All the types of the citing and cited publications are taken into account.

The data as of November 11, 2016 show that in the period under consideration the values of the Hirsch index increased manifold at all academic institutions. It is logical that the greatest growth rate is observed in the organizations that had low rates at the beginning of the measurements. On average, the indexes increased in 2–3 times. This correlates with the growth rate of the total number of publications and their citations. The highest value of the index is observed in the Central Economics and Mathematics Institute – 98. This means that the total number of publications of the institute researchers, each of which has almost 100 links and more, is also close to one hundred. In general, ten institutes have the *h*-index that exceeds 30. Such values of the index show that the organizations fairly quickly accumulate the publications that receive many citations.

Highly cited publications of RAS economic institutes

The study of the citation data for RAS economic institutes has shown that many of them have achieved significant results in this direction. In our view, their performance indicators are due to their highly cited publications.

As we have noted, in the terminology of the Essential Science Indicators international database, the works are considered highly cited if they fall within the 1% of the most cited publications in the world among those published in the same year in the same research field. Experts believe such works to be of the highest quality and to have left their mark not just in "science" but in the "science of the higher level" [8, p. 99]. We believe that the basic principles of the methodology for determining highly cited publications can be applied not only to scientific fields but also to certain groups of scientific organizations. Thus, to determine how many highly cited publications a RAS economic institute has, it is necessary to compare its publications to those of other similar organizations. Thus, the selection of highly cited publications of a scientific institute depends not on its own works and their citation, but on how its performance is viewed against the background of all the other organizations in the reference group.

The analysis is carried out on a large array of publications of RAS economic institutes over the period from 2011 to 2015 covering more than 23.5 thousand of

original documents. Since it is incorrect to compare the works of different years due to the fact that some of them could get more citations due to the fact that they were published earlier, the comparison is made in several subsets of publications united by the same year of publication. Publications in each subset are arranged in descending order of citation; after that, the upper section covering 1% of the total number is defined, and a threshold value for the number of citations is set out for a publication to get into the selected "top". These very publications will be recognized as highly cited in this reference group. At the same time a threshold value is established for the number of citations a publication must receive to get into the upper section, and on its basis the number of highly cited papers is calculated for all organizations.

The use of the described methodology allowed us to identify highly cited publications of 236 RAS economic institutes over the period from 2011 to 2015. *Figure 4* presents the data on the number of publications for each year of the period indicated. It also displays the threshold values of the number of citations that a work published during the specified year has to receive in order to join the 1% of the highly cited works.

The results of the analysis show that the total number of references to the publications included in the upper section of the most cited works is 14.7 thousand. Thus, the 1% of all publications of RAS economic institutes for the period under

Figure 4. **Distribution of highly cited publications of RAS economic institutes for the period from 2011 to 2015** (data of SEL as of November 11, 2016)
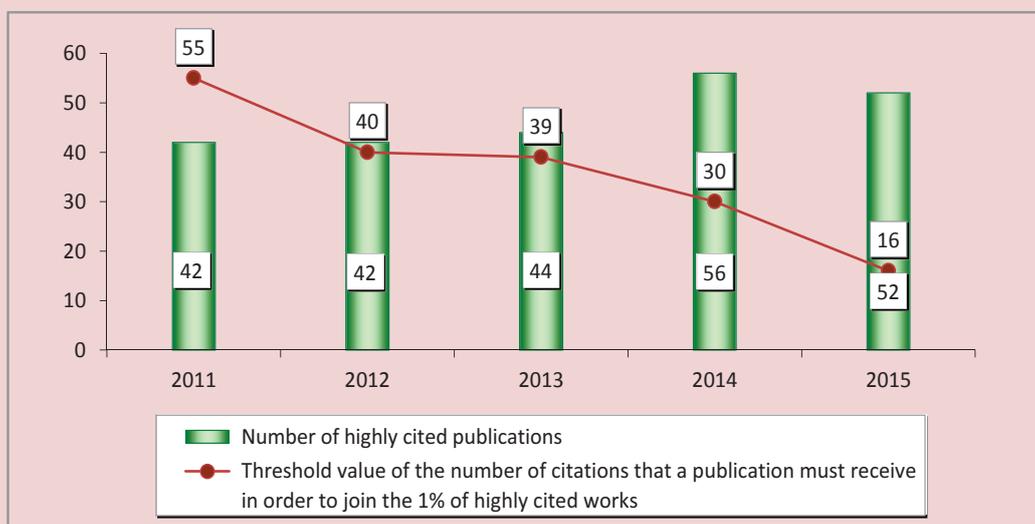
consideration accounts for 10.5% of the citations, i.e. every tenth link is made to a highly cited article.

The distribution of the number of highly cited publications by scientific institutions is presented in *Table 5*. It has been found out that half of that number is distributed among three organizations: RAS Institute of Market Problems (18.2%), RAS Central Economics and Mathematics Institute (17.4%) and RAS Institute of Economics (14.8%).

The analysis of relative indicators that show the percentage of highly cited articles published by an organization has shown that the largest share of highly cited publications in the total number of all works belongs to RAS Market Economy Institute. We can conclude that, on average, every twentieth publication by its researchers becomes highly cited compared to the publications of other institu-

tions within this reference group. Approximately one in 55 publications becomes highly cited among the publications of RAS Central Economics and Mathematics Institute, and one in 60 publications becomes highly cited among those of RAS Institute of Economic Forecasting and RAS Institute of Socio-Economic Studies of Population. Consequently, the presence of a large number of such papers allows an organization to have relatively high citation indices. Thus, on the basis of the data about publication activities of RAS Institute of Socio-Economic Studies of Population, in 2014, three of its papers accounted for 77% of all the links received during the year (560 of 726 citations), and in 2015, four of its papers received 956 links (74% of the total number of citations per year). In all the cases we are talking about the articles prepared by large teams of authors and published in

Table 5. Distribution of highly cited publications of RAS economic institutes in the
Russian Science Citation Index (data of SEL as of November 11, 2016)

№	Institute	Number of highly-cited publications	Share of highly-cited publications of an organization in the total number of highly-cited publications, %	Share of highly-cited publications of an organization in the total number of its own highly-cited publications, %	Position in the ranking according to the number of highly-cited publications
1.	RAS Market Economy Institute (MEI RAS)	43	18.2	4.7	1
2.	RAS Central Economics and Mathematics Institute (CEMI RAS)	41	17.4	1.8	2
3.	RAS Institute of Economics (IE RAS)	35	14.8	1.3	3
4.	RAS Institute of Economic Forecasting (IEF RAS)	28	11.8	1.7	4
5.	Institute of Economics, Ural Branch of RAS (IE UB RAS)	18	7.6	0.5	5
6.	RAS Institute of Socio-Economic Development of Territories (ISEDT RAS)	11	4.7	0.5	6-7
7.	Institute for Social and Economic Research, Ufa Scientific Center of RAS (ISER USC RAS)	11	4.7	0.8	6-7
8.	Institute of Economics and Industrial Engineering, Siberian Branch of RAS (IEIE SB RAS)	10	4.2	0.4	8
9.	RAS Institute of Socio-Economic Studies of Population (ISESP RAS)	8	3.4	1.7	9-11
10.	Institute of Social and Economic Research, Dagestan Scientific Center of RAS (ISER DSC RAS)	8	3.4	1.1	9-11
11.	Luzin Institute for Economic Studies, Kola Scientific Center of RAS (LIES KSC RAS)	8	3.4	0.5	9-11
12.	Economic Research Institute, Far Eastern Branch of RAS (ERI FEB RAS)	6	2.5	0.9	12
13.	Institute for Social and Economic Research and Humanities, Southern Scientific Center of RAS (ISERH SSC RAS)	3	1.3	0.3	13
14.	Institute for Socio-Economic and Energy Problems of the North, Komi Scientific Center, Ural Branch of RAS (ISEEPN KSC UB RAS)	2	0.9	0.6	14-15
15.	Institute of Economics, Karelian Research Center of RAS (IE KRC RAS)	2	0.9	0.8	14-15
16.	RAS Institute for Regional Economic Studies (IRES RAS)	1	0.4	0.2	16-17
17.	RAS Institute of Agrarian Problems (IAP RAS)	1	0.4	0.2	16-17
18.	Saint Petersburg Institute for Economics and Mathematics, RAS (SPIEM RAS)	-	-	-	18-19
19.	Sochi Research Center of RAS (SRC RAS)	-	-	-	18-19

one of the most respected general medical journals "The Lancet". The presence of highly cited publications allows the Institute to take the fifth place in the ranking of organizations by total number of citations over five years, while having a relatively small number of publications (14th position for 2011–2015).

It is obvious that the analysis of highly cited publications presents additional opportunities for a more detailed assessment of the impact of research works. In our opinion, these data push the limits of the approaches based on the use of absolute indicators to count the number of publications and citations, these indicators are currently used at the official level to monitor and evaluate the performance of research organizations. But their wide application requires the presence of databases that would automatically generate all the necessary data not only about the publications covered in Web of Science, but also at the national level for Russian scientific works.

Conclusion

The present work contains a comprehensive analysis of the publication activity and research impact of 19 economic institutes. They are ranked according to several criteria, in particular, according to the total number of publications in the Russian Science Citation Index and in the journals on the VAK List, according to the number of citations, to the value of the Hirsch index and the number of publications recognized as highly cited for this reference group. The analysis is

performed on a large array of bibliometric indicators for the period of 2011–2015, the data having been obtained from the information-analytical system of the Russian Citation Index.

The results of the study prove that scientific organizations are increasing their publication activity, they publish the works important for their scientific specialty and enjoying high demand in the scientific community, as evidenced by continuously increasing citation indicators. The total number of publications of the institutions in the analyzed period has increased by 30%, while the number of citations of all the works has grown twofold. The peak of publication activity of the institutions falls on 2014, which, in our opinion, is partly due to the official approval of the list of information about the results of activities of scientific organizations to be submitted to the monitoring, and which identify the indicators to assess the relevance of scientific research, including the number and cumulative citation of publications indexed in Russian and international information-analytical systems.

A disturbing trend is associated with the fact that in 2015 there was a significant reduction in the volume of publications in the journals included in the VAK List. Since the number of VAK publications is often regarded as a criterion for identifying the proportion of articles of a higher quality in the total amount of publications of an organization, the reasons for the decline in the number of such

publications require that research institutes consider them separately and take additional efforts to correct their publication policy.

Nevertheless, the overall increase in citation indicators shows that the results of the work of RAS academic institutes are important for the Russian economic scientific community. The dynamics of the values of the *h*-index is indirectly confirmed by the increased level of scientific productivity of organizations on average in 2−3 times. This correlates with the growth rate of the total number of publications and links to them.

As follows from the data of citation analysis, significant indicators of several scientific organizations are due to their highly cited publications. In general, 1% of all publications of RAS economic institutes for the period of 2011−2015 account for 10.5% of citations, i.e. every tenth link accounts for the article that is highly cited for this reference group. A study of the relative indicators showing what percentage of the organization's publications falls within the 1% of highly cited papers has allowed us to establish that on average one in twenty publications becomes highly cited in the organization leading by this indicator.

In conclusion, we note that the presented results enable a more comprehensive approach to the performance evaluation of scientific organizations, but even this approach, in our opinion, does not allow making any management decisions based only on the account of the publication indicators. Comprehensive evaluation requires the participation of experts. Bibliometric information in this case can only serve as an additional source of detailed information about a particular scientific organization.

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