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USAGE OF OPEN ACCESS JOURNALS IN RUSSIAN PUBLICATIONS: WEB of SCIENCE, 2008-2017

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Abstract

The development of the Open Access (OA) journals system, its advantages, anddisadvantages are discussed. The bibliometric statistics on Russian research performance(RP) were collected from the Science Citation Index – Expanded (SCI-E) for the period 2008-2017. During this period, Russian researchers published about 34,160 articles in Gold OAjournals which share in the total Russian research performance (303,877 articles) accounts for11.2 percent. The usage pattern of Gold OA journals shows a stable growth rate of publications from 7.8% in 2008 up to 13.7% in 2017. Despite the high cost of OA publications, the Russian Academy of Sciences has the highest share (58.6%) of OA papers. We assume that this is an impact of a robust international collaboration of Russian researchers with the US (31%), Germany (29%) and other industrialized countries that cover the cost of collaborative publications. Among the funding organizations that aim to promote Russian participation in the OA system a critical role belongs to the Russian Science Foundation, the Russian Foundation for Basic Research as well as to CNRS (France), the US National Science Foundation and others. The international collaboration and government appropriations for research in universities had substantial impact on citations score: share of Gold OA highly cited articles amounted to 52% out of the Russian total RP. Leading Research Areas (RA in SCI-E) of Gold OA publications turned out to be entirely different compared with a disciplinary structure in total Russian RP. As an example, one of the most critical research areas in the world - "Scientific Technologies" ranked the third place compared to the ninth place in the total Russian RP. Russian scientists widely use the highest quality foreign journals of the Gold OA system indexed in SCI-E, the only Russian OA journal indexed in SCI-E is “Physics of Condensed Matter” which has the highest share of all Russian publications in Gold OA journals.

Introduction

Open Access system (OA) is one of the hot topics discussed by well-established publishing companies and scholars' community. As G. Eysenbach noted in 2006, the Open access system has the potential to accelerate recognition and dissemination of research findings, but its actual effects are controversial. Some researchers stated that Gold OA journals are cited more highly than printed journals (Sotudeh, 2015); other reports (Moed 2007, Bjork 2012, Solomon 2013, Wray 2016) give evidence that OA journals attract less citations. According to Solomon DJ (2012) article-processing charge (APC) is the central mechanism for funding the OA system. Many researchers discussed the high cost per page in various OA journals. This cost is much higher in well-established journals and low in developing countries. As a consequence of the low cost per page, the number of predator journals is growing. This is why information specialists and bibliometricians should play an important role in the special education program on traditional and new publishing system.

Among recent bibliometric studies of OA system we refer particularly to Prof. G. Lewison's (2015) presentation at the ISSI conference in China in 2017. The author investigated the growth of Gold OA journals and disciplinary domain that embraced this new system and which country benefited from free access to OA publications. Countries were selected according to their research performance (RP) in Web of Science (WoS) and divided according to their gross national product per capita into four groups: high income countries, upper middle income, middle income and low-income countries. All publications were assigned to five major fields of science. The interesting result is that richer countries publish less in OA journals in all domains than poor countries. As an example, the USA turned out to be below the world average in all five major fields, but Brazil was above average in all areas except for physics, and India has been above average in physics, biomedical research and engineering. Russia was above average only in physics. In January 2018 Dr. Archambault E. published a comprehensive longitudinal study on availability of Green OA journals focused on comparison of two bibliographic databases *Web of Science* and *Scopus* with the special database (designed by his company) whose goal was to facilitate retrieval of Gold and Green OA articles published in peer-reviewed journals. According to his findings, articles published in 2014 were available free in health sciences (about 60%), followed by natural sciences (55%), applied sciences (45%) in 2016. Disciplinary domains of art and humanities were significantly less available (24%) www.science-metrix.com

In the Directory of Open Access journals (DOAJ) there are 132 Russian journals. Only one of them "Physics of Condensed Matter" is indexed in the Web of Science (WoS) Core Collection and in Journal Citation reports (JCR).

It is worthwhile to notify that since 2006 Russian government took a few initiatives to reform two main Russian research bodies the Russian Academy of Sciences (RAS) and the Higher Education Sector. One of the most critical action was taken by President of the Russian Federation V. Putin (Decree 599, 2012) was assignment of a new project, denoted as Project 5-100, when special funding was transferred to a selected group of universities (Moed H., 2018).

The Russian government assigned 44 billion Rubles (around 730 million US$) for the Project 5-100 implementation for the period 2013-2016. After two tiers of competition 14 universities were selected; in a later phase, one was added. Each year, all universities were divided into 3 groups according to their results. Each university belonging to the first group receives about 960 MLN Rub.; universities in the second group receive 450-540 MLN Rub each. Finally, each university of the third group obtains about 100 MLN Rub. Meanwhile, it was a significant reduction of research personnel and budget of RAS. Bibliometric indicators play an important role in the evaluation of the efficiency of government reforms (Moed H., 2018).

Since 2016 a new option of Web of Science was introduced marking Open Access publications in Gold Open Access journals (Gold OA) and Green Open Access journals (Green OA). We set up a goal of our paper to overview trends in usage pattern of Gold Open Access journals as a tool for scientific communications and its impact on bibliometric performance indicators by Russian scholar community during the period 2008-2017.

Methods.

The primary sources of bibliometric statistics were resources produced by Clarivate Analytics: Science Citation Index –Expanded (SCI-E), Social Science Citation Index (SSCI) and Arts & Humanities Citation Index (A&H CI) that are part of the Web of Science (WoS) Core Collection. A search was performed on March 17.2018. Due to the significant difference in Russian research performance (RP) between SCI-E (about 33,000 records) and SSCI (about 1,200 records) and A&H CI (300 records) yearly, our analysis was focused on the records indexed only in SCI-E.

Since 2016 Gold OA records are marked in the WoS, we used this marking to differentiateOA and non-OA records and trace the evolution of OA usage. Open Access journals are divided into

two groups: Gold OA and Green OA journals in WoS. Our analysis was focused on Gold OA journals that accounts for 95% of all OA records affiliated with Russia. Only articles and reviews (A&R) as a more critical type of publications were selected for the analysis. Bibliometric indicators were as follows: total Russian publication counts (research performance - RP), OA publications counts and it's share, distribution of total RP and Gold OA publications by leading organizations, collaborative countries, and funding agencies; the percentage of Gold OA highly cited articles.

Special attention was paid to careful visual and manual verification of names of organizations and funding agencies. In our paper, we are focused on publication counts and do not assess citation impact, an aspect of the great importance of a fully-fledged bibliometric assessment study (Moed et.others, 2018)

Results and Discussion

A growth rate in 1.43 fold in research performance (RP) in SCI-E (1,651,875 publications) was observed in 2017 compared with 2008 (1,157,506 publications). The growth in the Gold OA publications was slightly higher - 1.73 folds. Russia occupies 15th place by RP and 29th place in Gold OA publications in SCI-E, 2017.

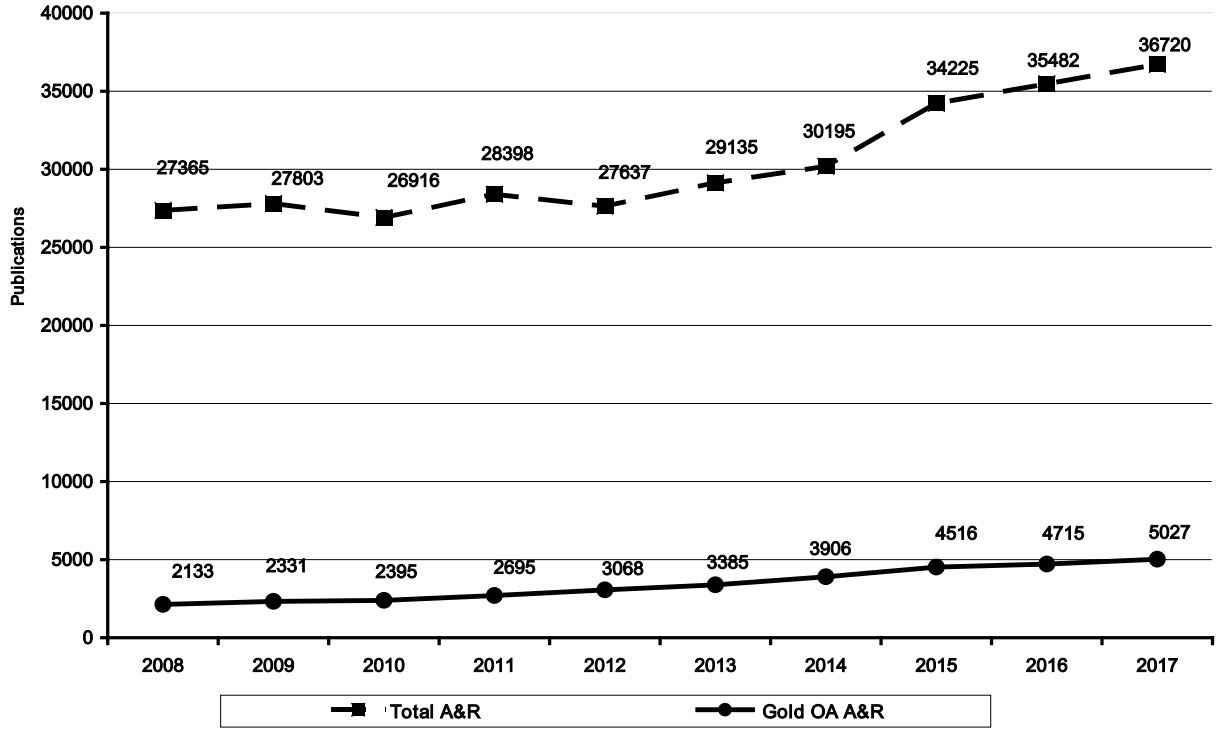
The trends of evolution of Gold OA publications share in the world in three main databases SCI-E, SSCI and A&HCI (column 2**),** separately in SCI-E ((column 3) and in total Russian RP (column 4) are presented in Table 1.

Table 1. Trends of evolution of Gold OA publications, WoS, 2008-2017.

Year	Share of Gold OA (A&R) in SCI-E, SSCI, A&HCI, (%)	Share of Gold OA (A&R) in SCI-E, (%)	Share of Gold OA (A&R) in total Russian RP in SCI-E, (%)
1	2	3	4
2008	19.7	21.08	7.79
2009	20.65	22.14	8.38
2010	21.49	23.10	8.90
2011	22.33	24.0	9.49
2012	23.65	25.44	11.10
2013	24.54	26.3	11.62
2014	25.53	27.3	12.94
2015	25.7	27.4	13.19
2016	25.44	26.74	13.27
2017	25.68	26.58	13.7

During 2008-2017 Russian researchers published more than 34,500 documents in Gold OA journals. Our finding indicates that an average share of Gold OA publication in Russia is still approximately twice less than in the world according to SCI-E in 2017. Trends on the Russian publication's growth in Gold OA journals in SCI-E are presented in Fig.1.

Figure 1. Growth trends in Russian Gold Open Access publications and total Russian research performance, SCI-E.



It was observed that the growth (in 2.36 folds) in absolute number of Russian publications in the Gold OA journals is significantly higher than the growth (in 1.3 folds) of total Russian RP during 2008-2017. There are many factors – financial, age, language barrier - that influence an author's decision whether to submit the manuscript to a regular journal or to Gold OA.

Two lists of twenty leading organizations (ranked by publications counts) in entire Russian RP and Gold OA publications were compiled with a respective share in Gold OA publications and in total Russian research performance. These data are presented in Table 2.

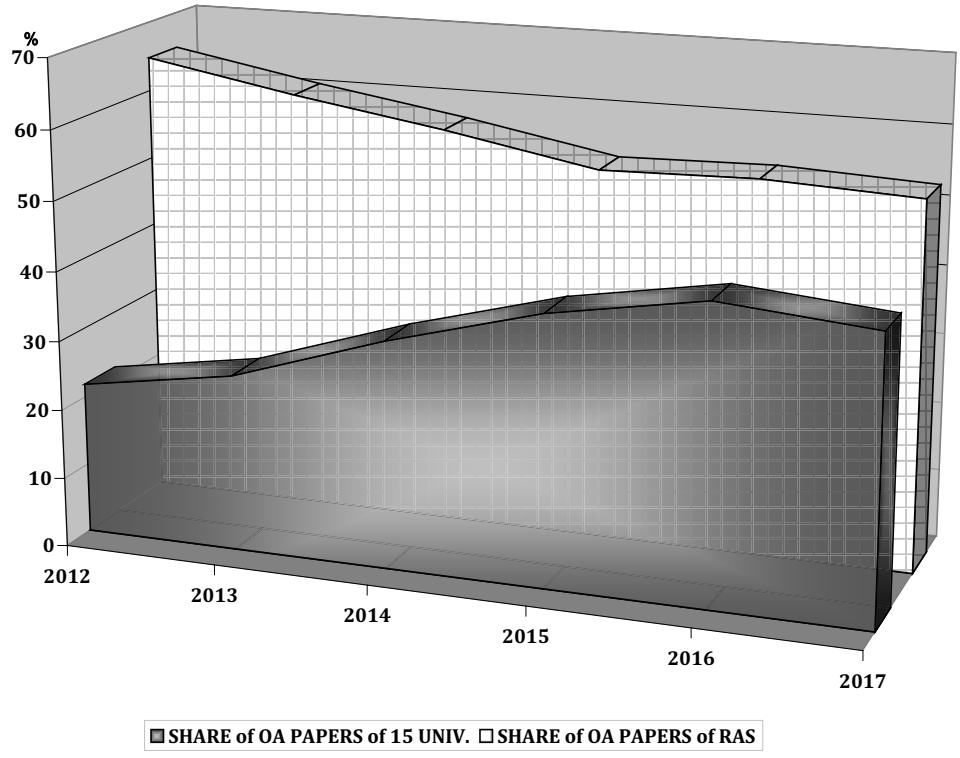
Table 2. The leading organizations by share of Golden OA publications, WoS, 2008-2017.

All publications of Russian authors			Publications only in Gold OA journals		
Rank	Organizations, combined	Share, %	Rank	Organizations, combined	Share, %
	In total 303,877 publications	100%		In total 34 ,160 publications	100%
1	Russian Academy of Sciences	56.6	1	Russian Academy of Sciences	58.6
2	Moscow State University	12.0	2	Moscow State University	17.7
3	St. Petersburg State University	4.3	3	Centre National de la Recherche Scientifique (CNRS)	12.0
4	St. Petersburg Scientific Center, Russian Academy of Sciences	4.2	4	Helmholtz Association	9.5
5	Centre National de la Recherche Scien- tifique (CNRS)	3.5	5	University of California System	9.0
6	Novosibirsk State University	3.5	6	Universite Paris Saclay Comue	8.8
7	National Research Center Kurchatov Institute	3.2	7	National Research Center Kurchatov Institute	8.6
8	Joint Institute for Nuclear Research	2.9	8	United States Department of Energy (DOE)	8.6
9	Helmholtz Association	2.7	9	Joint Institute for Nuclear Research	8.0
10	Ioffe Physical-Technical Institute, Russian Academy of Sciences	2.7	10	Alikhanov Institute of Theoretical and Experimental Physics	7.9
11	Lebedev Physical Institute, Russian Academy of Sciences	2.5	11	CNRS National Institute of Nuclear Particle Physics IN2P3	7.6
12	Moscow Institute of Physics and Technology	2.3	12	Max Planck Society	7.6
13	National Research Nuclear University MEPhI	2.1	13	Instituto Nazionale di Fisica Nucleare	7.6
14	Ural Federal University	1.9	14	Konstantinov Petersburg Nuclear Physics Institute, National Research Center Kurchatov Institute	7.2
15	Universite Paris Saclay Comue	1.8	15	Lebedev Physics Institute, Russian Academy of Sciences	7.1
16	University of California System	1.8	16	Sapienza University Rome	7.1
17	United States Department of Energy (DOE)	1.8	17	CEA (Commissariat à l'énergie atomique et aux énergies alternatives)	6.9
18	Max Planck Society	1.8	18	Consejo Superior De Invesatigaciones Cientificas CSIC	6.9
19	Russian Academy of Medical Sciences	1.8	19	European Organization for Nuclear Research (CERN)	6.5
20	Alikhanov Institute of Theoretical and Experimental Physics	1.8	20	St. Petersburg Scientific Center, Russian Academy of Sciences	6.5

As it was mentioned in many papers (Graham 1995, Karaulova 2016, Markusova, 2014) the Russian Academy of Science (RAS) is the leading basic research body. Its leading role is confirmed by high share 56.5% and 58.5% correspondently in total Russian RP and Gold OA publications during 2008-2017. Nevertheless the RAS budget was cut off, and increased slightly in 2018. No wonder that the RAS share of Gold OA publications decreased significantly from 65.8 per cent % to 53.9 % correspondently in 2012 to 2017.

As was mentioned above, the significant investment in Program 5-100 stimulated the tremendous growth of universities' publications in 2012-2017. These fifteen universities' share of Gold OA publications increased from 14.8% in 2012 to 31.54% in 2017. The impact of financial investments on the pattern of Gold OA usage is displayed in Fig.2.

Figure 2. Share of Gold OA publications by the RAS and universities included in Program 5-100, SCI-E, 2008-2017.



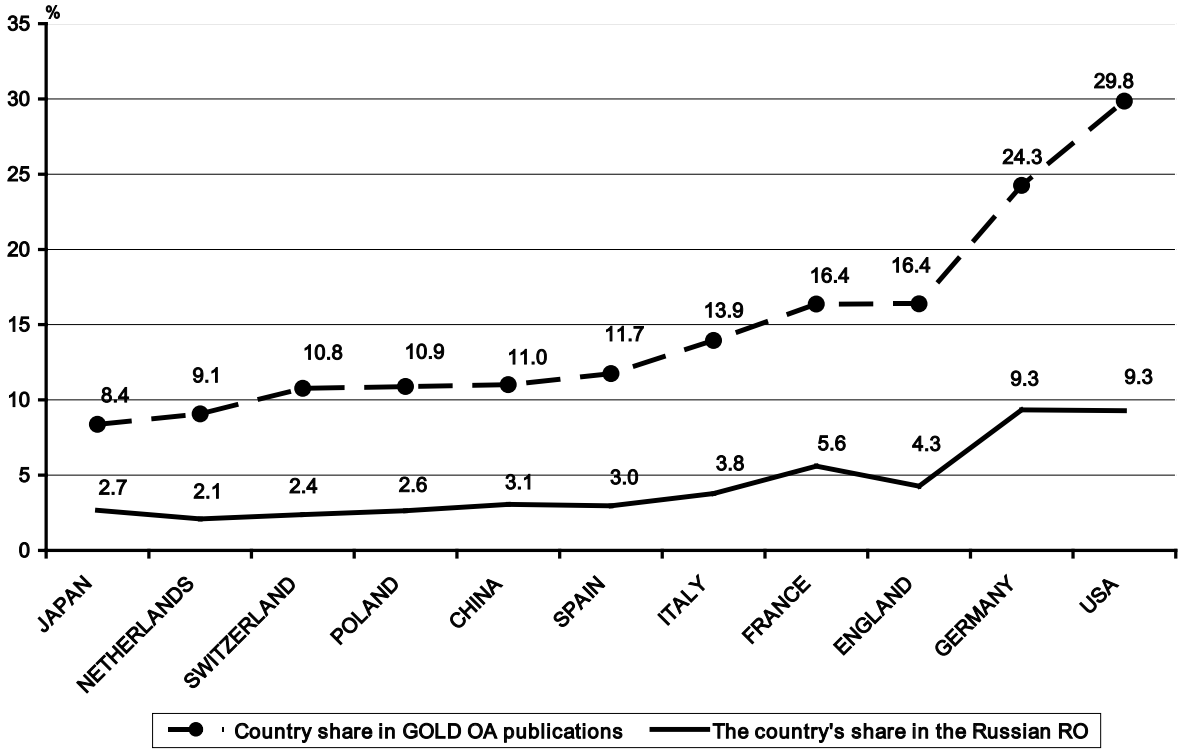
There are fourteen foreign organizations among the top twenty (Table 2) that had collaborative papers in Gold OA publications and only six of them are among the top in total RP. This finding provides indirect evidence that international scientific collaboration allow Russian researchers to overcome the financial obstacle.

Disciplinary distribution of Russians publications was traditionally focused on “hard sciences” (Markusova, 2018). To investigate the disciplinary difference /or similarity in research priorities there were selected top 50 Research Areas among Gold OA publications and total Russian research performance. Our findings show that leading Research Areas (RA) of Gold OA publications were entirely different compared with disciplinary structure in total Russian RP. As an example, one of the most critical research areas in the world - "Scientific Technologies" ranked third compared to the 9th place in the total Russian RP. Another striking result was that share of RA “Oncology is 5-fold higher than in total Russian research performance, this is partly due to strong collaboration of the Russian National Cancer Research Center with National Institutes of Health (NIH).

It is well-known that the governments of the European Union countries and the USA actively promote the OA system for disseminating knowledge obtained at taxpayers' expense. Our data demonstrate a significant influence of various funding agencies on the number of publications in Gold OA journals as compared with total Russian RP during 2008-2017. The share of funding agencies reached 79.8 % among publications in Gold OA journals and 61.8% in total RP. Among the most active Russian funding organizations is the Russian Foundation for Basic Research in collaboration with CNRS (France), the National Science Foundation (USA), the National Institutes of Health (USA) and the Russian Science Foundation (RNF) established only in 2013. An average amount of RNF grant is about $100,000 per year that is five folds more than an average grant of RFBR.

According to Wagner C.(2017) international projects account about 20% of national government spending on scientific research. International collaboration of Russian researchers have a significant impact on opportunity to be published in Gold OA journals. Our data demonstrate the higher percentage of these publications compared with the share of industrialized countries in total Russian RP. These data are presented at Figure 3.

Figure 3. Share of international collaboration in Russian Gold Open Access publications and in total Russian research performance, SCI-E, 2008-2017.



This chart demonstrates clearly the growing activity of Russian collaboration between industrial countries in Gold OA publications. The share of each of the countries - USA and Germany - has increased almost three fold compared to their share in total Russian research performance. The international collaboration had the impact on citations score: share of Gold OA highly cited articles amounted to 52% out of the Russian total RP.

Conclusions

Trends in the usage pattern of Gold OA journals revealed a stable growth rate of publications from 7.8% in 2008 up to 13.7% in 2017. Despite high Gold OA publications cost the Russian Academy of Sciences had the highest share (56.5%) of OA papers. However, a significant decrease in its share in Gold OA publications from 65.1% to 52.9% was observed correspondingly from2012 to 2017.

Due to government investments in fifteen selected universities (Program 5-100), their share in Gold OA publications doubled in 2017 compared with 2012. Our findings indicate an impact of a

robust international collaboration of Russian researchers with the USA (31%), Germany (29%) and other industrialized countries that cover the cost of collaborative publications. Leading Research Areas (RA in SCI-E) of Gold OA publications were entirely different as compared with a disciplinary structure in total Russian research performance. The implications of our analysis provide a better empirical basis for science policy with respect to disseminating the results of the Russian research using Gold OA system.

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