The Webometric Estimate of the Publication Activities of Universities: The Influence of the Belgorod Declaration

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Abstract—This paper gives the webometric estimate of the functioning of the universities included in the Near-Frontier Belarusan–Russian–Ukrainian University Consortium (in the context of the adoption of the Belgorod Declaration on open access to scientific knowledge and our cultural heritage) during 2008–2009 on the basis of the Spanish webometric university ranking and the potential of the Google Scholar search engine. The classification of the universities of the Near-Frontier Belarusan–Russian–Ukrainian University Consortium has been built according to the degree of publication activities. The influence of the Belgorod Declaration on university publication activities was shown.

Key words: webometric estimate, open access, Google Scholar search engine, publication activities, universities, Near-Frontier Belarusan–Russian–Ukrainian University Consortium, Belgorod Declaration

Since 2004, the Spanish cybermetric laboratory has been calculating the webometric rankings of the world's universities that have autonomous domains (URL addresses) (www.webometric.info). This global university ranking is on a par with the British Times Higher Education Supplement (THES) Ranking, as well as with the Shanghai and Taiwanese University Rankings.

The following indices are measured based on the responses received from four high-capacity search engines (Google, Yahoo, Live Search, and Exalead): SIZE (the total number of pages obtained from the above-mentioned engines for each university domain), VISIBILITY (the total number of unique external citations obtained with the help of the last three engines), RICH FILES (the number of pdf, ps, doc, and ppt file formats obtained using the first engine), SCHOLAR (the number of academic documents and their citation obtained with the help of the Google Scholar search engine); and subsequently, the integral webometric index, according to which the world's universities are ranked, was calculated using special mathematical procedures [1].

We consider this ranking to be the key indicator of how much universities are involved in the processes of the international movement towards open access to scientific knowledge. These processes are connected with the specific mechanisms and instruments described in the initiatives and declarations about open access to scientific knowledge: the Budapest Initiative, Berlin Declaration, Scotland Declaration, etc. The Belgorod Declaration about open access to scientific knowledge and cultural heritage ranks with these initiatives and declarations. The electronic archives for open access to scientific publication (OA (open-access)-repositories), whose international registers are held at the Southampton (ROAR) and Nottingham (DOAR) Universities, are the major instruments of this movement. Signing the Belgorod Declaration on January 30, 2008, the universities of the Near-Frontier Belarusan–Russian–Ukrainian Consortium (NBR-UUC) took the initiative to create such archives [2]. The first OA-repository was created within the framework of this declaration based on the open DSpace software at the Belgorod State University in May 2009, and the analogous repository was created little later at Kharkov National University.

The effect of creating such electronic archives can be estimated using the systematic monitoring of the Spanish webometric rankings and experiments with the Google Scholar search engine. The dynamics of the webometric rankings of the NBRUUC universities for the last 1.5 years are given in table 1, which represents 6 of 10 NBRUUC universities ranked by the Spanish cybermetric laboratory. It is of note that the rankings of the universities, included in TOP-500 were published until January inclusively, and those included in TOP-6000 were published until July 2009. It follows from this that four remaining NBRUUC universities (the Taurida National University (TNU), Zaporozhye National University (ZNU), Donetsk National University (DNU), as well as Kursk State University (KurSU)) were included in the seventh thousand of universities according to the webometric ranking.

Table 1 shows how strongly the webometric ranking is affected by the modernization of the site and change of its URL-address, although the rating was restored during the next year after its significant decrease. The

Table 1. The dynamics of the webometric rankings of the NBRUUC universities

Universities	World webometric rankings				The changes in a ranking for 0.5 years			The changes in a ranking for 1.5 years
	January 2008	July 2008	January 2009	July 2009	06.08–01.08	01.09–06.08	06.09–01.09	06.09–01.08
GSU YC	Lower than 5000	Lower than 5000	Lower than 5000	5805				
VSU	2370	2377	2625	1752	−7	−248	873	618
SFU	4743[1]	3036	2579	1286	1707	457	1293	3457
BelSU	3802	3660	4108[2]	2511	142	−448	1597	1291
KNU	2946	2305	2629[3]	2570	641	−324	59	376
EUNU	Lower than 5000	Lower than 5000	Lower than 5000	5590				

Notes: [1]: The low ranking is connected with reorganizing (enlarging) the university and transforming its site (the change in the URL-address);

[2]: The site of the BelGU was transformed since September 2008; this being the case, despite its URL address having been retained, the resources of the former site, which did not automatically move to the new site, have become badly accessible to search engines;

[3]: The decrease in the ranking is connected with modernizing the site.

GSU (Gomel State University);
VSU (Voronezh State University);
SFU (Southern Federal University);
BelSU (Belgorod State University);
KNU (Kharkov National University);
EUNU (East-Ukrainian National University).

table also shows the strong increase in the ratings of the Belgorod State University (BelSU) and Southern Federal University (SFU) for the first half of 2009, which is connected with the creation of an OA-repository in the former university and joining web resources during the amalgamation of a number of universities with Rostov State University.

Studying the structure of the webometric ratings permits one to understand at what expense they change. Table 2 shows that the rank (place) of the SIZE index presenting the total number of documents found by the search engines in the sites of these university very strongly increased for a year and a half for the Southern Federal University (by 2496 positions), which conducts the process of integrating web resources that has been mentioned above. This being the case, the visibility of documents also abruptly increased in the site of the SFU. The large growth of these two indices led to the moderate growth of two others.

The Belgorod University had the greatest growth of the SCHOLAR index (by 911 positions), which is connected to the creation of an OA-repository (dspace.bsu.edu.ru). Its creation also resulted in the fact that pdf files of the scientific documents of the bibliographic index for the BelSU Scientific Library (elibrary.bsu.edu.ru) were more visible to the Google Scholar search engine. This is likely to be connected with the fact that the same pdf files were also used as an OA-repository. Note that the full-text documents of the bibliographic index for the BelSU Scientific Library were very poorly found by the School Scholar search engine. The strong growth in the rank of the index under consideration, together with the significant growth in the rank of the VISIBILITY index, surpassed the decrease in the rank of the SIZE index and, finally, led to an increase in the integral webometric rating of the BelSU by 1597 positions (see table 1).

The responses received from queries to the URL-addresses of the NBRUUC universities that were made using the Google Scholar search engine were also estimated by the values of the SCHOLAR constituent webometric rating, measured by the Spanish cybermetric laboratory. As a whole, they are in agreement with the above-described calculations (see table 2), with the exception of our estimates for KNU, for which there may be reasons, which we will touch upon somewhat later.

In order to show the character of the fluctuations in responses to queries of the Google Scholar search engine, we made queries for two proximate dates (September 26, 2009 and October 7, 2009). For a small number of responses, such fluctuations can be of several orders (the KurSU); for a large number of responses (on the order of 10^3), they can vary up to 3–8% (VSU and KNU). This is connected with the searching process running uninterruptedly, as a result of which newfound documents constantly appear and irrelevant or dupli-

Table 2. The structural dynamics of the webometric rankings of the NBRUUC universities

Date, universities	The constituents of the webometric ranking			
	SIZE	VISIBILITY	RICH FILES	SCHOLAR
July 2008				
VSU (Voronezh State University)	1499	4046	2462	660
SFU (Southern Federal University)	4781	3429	2975	2709
BelSU (Belgorod State University)	2216	5793	3098	2263
KNU (Kharkov National University)	2724	2648	3572	2104
January 2009				
VSU (Voronezh State University)	2053	4415	2165	564
SFU (Southern Federal University)	4199	2708	2905	2331
BelSU (Belgorod State University)	2851	6475	2347	2501
KNU (Kharkov National University)	3041	3158	3758	1875
July 2009				
VSU (Voronezh State University)	1958	3970	2295	587
SFU (Southern Federal University)	2285	640	2375	2250
BelSU (Belgorod State University)	3367	4257	3083	1352
KNU (Kharkov National University)				
The changes in the constituents of the ranking for 1.5 year				
VSU (Voronezh State University)	−459	76	167	73
SFU (Southern Federal University)	2496	2789	600	459
BelSU (Belgorod State University)	−1151	1536	12	911
KNU (Kharkov National University)	−503	1418	210	557

Table 3. The dynamics of the responses received from the queries to the site addresses of the NBRUUC universities during the simple search in Google Scholar

A university	The simple search option	The number of responses		
		26.09.2008	26.09.2009	07.10.2009
GSU (Gomel State University)	site: gsu.unibel.by	159	124	121
VSU (Voronezh State University)	site: vsu.ru	3680	3760	3660
SFU (Southern Federal University)	site: sfedu.ru	106	850	982
BelSU (Belgorod State University)	site: bsu.edu.ru	125	850	982
KurSU (Kursk State University)	site: kursk-uni.ru	5	456	436
KNU (Karazin Kharkov National University)	site: univer.kharkov.ua	1410	1170	1260
EUNU (East-Ukrainian National University)	site: snu.edu.ua	4	14	14
TNU (Taurida National University)[2]	site: crimea.edu/thu[1]	390	–	–
DNU (Donetsk National University)	site: donnu.edu.ua	5	87	87
ZNU (Zaporozhye National University)	site: znu.edu.ua	89[2]	317	310

Notes: [1]: The new site address http://www.crimea/tnu appeared at the end of 2008, however, the responses to this site were absent during our queries.
[2]: January 22, 2009

cated documents disappear. Therefore, in the event that the monitoring of responses to queries of the Google Scholar search engine, as well as those of any other search engine, is regular, it is expedient to take the averaged trends into account.

Allow us to make a small comment on table 3.

For the Gomel State University, there were a great number of articles in English from two sites on September 26, 2008, viz., nit.gsu.unibel.by; newit.gsu.unibel.by; subsequently, the search was

Table 4. The number of scientific articles published by the scientists of the NBRUUC universities (the responses of Google Scholar to the English names of universities)

Dates	Universities										The conditions of the widened search with the exact phase
	KNU	DNU	TNU	EUNU	ZNU	SFU	VSU	BelSU	KurSU	GSU	
October 7–8, 2009	4751	990	384	174	93	5438	2940	397	59	388	With the limitations on fields of science and time intervals
	6085	1024	432	215	137	6169	3380	471	78	447	With the limitations on fields of science
	7244	1270	479	248	198	6720	3360	636	155	512	Without the limitations on fields of science and time intervals
December 30, 2008	5589	911	340	188	105	5101	2716	351	61	361	With the limitations on fields of science
	6278	1073	371	209	155	5540	3100	394	81	403	Without the limitations on fields of science and time intervals

reoriented to the site gsu.unibel.by with a predominance of articles in the Russian language.

The pdf files of articles from the "Vestnik VGU" were predominant in the responses to the queries to the URL address of Voronezh State University during the entire annual period.

The Southern Federal University was previously represented mainly by documents in the Russian language, and, since September 26, 2009, a great number of responses from certain sites have appeared, viz., gsen.pi.sfedu.ru, open-edu.sfedu.ru, math.sfedu.ru, etc., which represent the sites of different teaching and scientific structures and programs; for example, the math.sfedu.ru site is the site of the SRI of Mechanics and Applied Mathematics.

As of September 26, 2008, Belgorod State University was represented mainly by irrelevant responses (the decisions of the Scientific Council, different curricula, etc.), and the reorganization of the Google Scholar search mechanism for the URL address of this university occurred over a year owing to the creation of an OA-repository (dspace.bsu.edu.ru), as has been noted above. This also resulted in improving the visibility of resources of the bibliographic index for the BelSU Scientific Library (elibrary.bsu.edu.ru).

For Kharkov National University an interesting situation was initially observed, where the Google Scholar search engine found a great number of English articles by e-mail addresses, the ending of which corresponded to the URL-address of the university (univer.kharkov.ua), which is incorrect. Subsequently, the search engine reoriented itself to the correct search, having removed such incorrect responses. This determined the decrease of responses over the year from 1410 to 1170. Meanwhile, the Google Scholar search engine identified a large number of pdf-files of English articles for this university in September–October 2009.

On the site of the Donetsk National University, documents in the Russian language that are not journal papers and scientific monographs were mainly found, despite this university's publication of a great number of proper scientific journals. The same situation is observed for the Zaporozhye National University, where documents in the Ukrainian language are predominant, and articles from the Vistnik (Bulletin) of this university sometimes occur.

The classical universities of Kursk and Lugansk had a number of responses to queries of their sites that was too small; therefore, it is not timely to speak about the character and properties of scientific documents placed in them.

The queries to the nonautonomous site of the Taurida National University initially led to irrelevant responses (information on departments and faculties, personal pages of teachers and scientists, information about the conferences held by the university, etc.), and subsequently, after creating the autonomous site, we did not receive responses to it using the Google Scholar search engine.

Table 4 presents the results of experiments with the Google Scholar search engine when the queries on the English names of the NBRUUC universities (widened searches with the accurate English name of a university and with consideration for different organizations) were made according to the technology we previously suggested [3, 4].

Table 5 gives the names of universities used in table 4, together with the numbers of responses as of the beginning of October 2009 that were received using the widened search without limiting the fields of the science and the time intervals.

We also tested the old names of the classical universities from the period when they were pedagogic institutes, but we received no more than 4–6 responses to

Table 5. The responses received to the English names of the NBRUUC universities during the widened search with the exact phase without the limitations on fields of science and time intervals (October 7–8, 2009, Google Scholar)

The Russian names	The English names	The number of responses;
Харьковский государственный университет	Kharkov State University	2510
	Kharkiv State University	244
Харьковский национальный университет им. В.Н Каразина	Kharkov National University	2840
	Kharkiv National University	1650
	Total	**7244**
Донецкий государственный университет	Donetsk State University	728
Донецкий национальный университет	Donetsk National University	542
	Total	**1270**
Симферопольский государственный университет	Simferopol State University	405
Таврический национальный университет им. В.И Вернадского	Taurida National V.I. Vernadsky University	21
	Vernadsky Taurida National University*	53
	Total	**479**
Восточно-Украинский государственный университет им. В.И Даля	East Ukrainian State University	54
	East Ukrainie State University*	8
Восточно-Украинский национальный университет им. В.И Даля	East Ukrainian National University	194
	East Ukrainie National University*	0
	Total	**256**
Запорожский государственный университет	Zaporozhye State University	140
Запорожский национальный университет	Zaporozhye National University	58
	Total	**198**
Ростовский государственный университет	Rostov State University	5840
Южный федеральный университет	South Federal University	189
	Southern Federal University*	691
	Total	**6720**
Воронежский государственный университет	Voronezh State University	3960
Белгородский государственный университет	Belgorod State University	636
Курский государственный университет	Kursk State University	155
Гомельский государственный университет	Gomel State University	512
	In sum	**21430**

Note: * The names of universities marked with starlets were not taken into account in the queries of December 30, 2008.

Table 6. The classification of the NBRUUC universities according to the degree of their publication activities (the number of Google Scholar responses to the English names of universities without limitation on the searching conditions)

The gradatio of responses	The degree of publication activities	Universities
From 0 to 250	Very low	EUNU, ZNU, KurSU
From 250 to 1000	Low	BelSU, GSU, TNU
From 1000 to 4000	Average	VSU, DonNU
Higher than 4000	High	KNU, SFU

them, which were not taken into account in the subsequent summarizing.

The following preliminary classification of universities according to the degree of publication activities (table 6) may be suggested based on the entire range of the changes in the responses of Google Scholar to the English names of the universities (see table 4).

If this situation is considered without limitations on the searching conditions, the maximum growth in responses to the English names of the NBRUUC universities was observed for the Kursk and Belgorod Universities (by a factor of 1.9 and 1.6, respectively), and the minimum one was observed for the Kharkov University (by a factor of less than 1.2) (see table 4).

Returning to the analysis of table 5, we should note that the largest classical universities of Kharkov, Rostov-on-Don, and Voronezh account for 84% of all publications of the NBRUUC in the English language, and the share of the Ukrainian universities in the publication potential of this consortium accounts for approximately 44%. This being the case, the summary publication potential of the NBRUUC yields to Moscow State University in the number of English publications, which were determined in the same way using the Google Scholar search engine (149000).

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