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Quantitative Frequency Analysis of Google Scholar Citation and Top 10% Most Cited Scopus Papers Profiles for Asian University Webometrics Ranking

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ABSTRACT

Objective: The paper aims at studying evolution of Webometrics Ranking methodology and conducting a comparative analysis of Asian universities lacking Institutional Google Scholar Citation profiles and Institutional Top 10% most cited Scopus papers profiles.

Methods: Using Webometrics Ranking data for January-July 2022, a comparative analysis of 46 Asian countries was made. The article also tracks evolution of Webometrics Ranking methodology.

Results: The study has shown that quite few Asian universities assign importance to the creation of Institutional Google Scholar Citation profiles. Only in three countries, Turkey, Jordan and Iraq, university administrations consider this aspect important. Two behavior strategies were identified for the universities and researchers from the countries with the highest university support of Institutional Google Scholar Citation profiles. The analysis of Webometrics Ranking methodology evolution has shown it has been drifting towards assigning larger weights to the research indicators of university performance, namely, to publication activity and citation. The present study helps understand how Asian scientists apply open access technologies and have their articles published in high impact journals.

Conclusion: There is a fairly good ranking correlation between Webometrics Rankings and a number of other leading university rankings, and this correlation is better in those countries and regions of the world where more attention is paid to open publications by university scientists. Therefore, our comparative analysis is very important, as it examines the universities of one of the largest regions of the world, Asia, with increasingly active research, in terms of how their scientists use open-access technologies (OA-repositories, OA-journals) that contribute to the creation of their Google Scholar Citation profiles, as well as their publications in high impact factor journals.

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Introduction

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 par with the THE-QS University Rankings, 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 abovementioned 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 (Aguillo et al., 2006), including logarithmic normalization and weighing, which made it possible to build an integral indicator on an additive basis.

The launch of this ranking took a lot of attention from university management around the globe, since, unlike all other rankings, it made it possible to rank almost all universities in the world. Therefore, there naturally appeared a great interest towards analyzing this ranking in comparison with other rankings in scientific discourse, as well. So as of November 27, 2022, an Advanced search in Google Scholar yielded the following responses to the requests including the various names of this ranking: Webometrics Ranking – 6.630/100; Webometric Ranking – 1.020/32; Webometrics Rankings – 304/5; Webometric Rankings – 105/1, where the denominator shows the number of responses (publications), in which the term under consideration is found in the title of publications.

Since the launch of the Webometrics ranking (2004), its methodology has been constantly changing, but in July 2016, the most significant change happened. If originally the third indicator (Openness) concerned the number of PDF files affiliated with the University site found through the Google Scholar search engine, from the second half of 2016, this indicator shifted towards the citations found through the same search engine, with the Openness indicator weighing only 10%. Naturally, most of the world universities were not ready for this change. They should have had their scientists create Personal Google Scholar Citation Profiles in advance, and those profiles tied to the university domain would have automatically made-up Institutional Google Scholar Citation Profiles. That very year also saw the introduction of the bibliometric Excellence indicator, weighing as much as 30%, to be calculated on the basis of the Institute Top-10% most cited Scopus papers profiles.

In July 2016, out of about 22, 000 universities of the world ranked with Webometrics, only 4, 120 universities had Institutional Google Scholar Citation Profiles. The further growth in the number of universities with such profiles had the following pattern: in January 2017 – 8, 634 (out of 26, 000 ranked universities), in July 2017 – 9,491, in January 2018 – 9,593, in July 2018 – 10,778 (Moskovkin, Yawei & Sadovski, 2019). January 2019, according to our data, saw an increase (11,401) in the number of universities with Institutional Google Scholar Citation Profiles. But according to the most recent data, the number of such universities in the world has sharply decreased: in January 2022, there were 7,420 such universities, in July 2022 – 7,619, and in January 2023 – 6,553. This was due to the fact that when the new Openness indicator was introduced into the methodology, when calculating the total number of citations of a university scientist basing on Institutional Google Scholar Citation Profiles, only the top-10 best Personal Google Scholar Citation profiles were excluded from the calculation, but later this indicator was made stricter (in 2022, only 20 best profiles were excluded from the calculation.

As for the 1,350 Russian universities, only 37 of them in July 2016 had Institutional Google Scholar Citation Profiles (only 2.7%). But, six months later, their number increased to 200 universities (Moskovkin, Yawei & Sadovski, 2019).

After a new version of the Webometrics ranking was launched, Galynsky (2016) calculated the share of the employees of the Belarusian State University (Belarus) without personal Google Scholar Citation Profiles, which turned out to be only 5-10% of the total number of employees. A similar situation was observed in other Belarusian universities, which resulted in all those universities having a low score of the Openness indicator (Galynsky, 2016).

The situation with the Excellence indicator in the world was even worse, as since 2016, when this indicator was first introduced, the number of Institutional Top-10% most cited Scopus profiles has been much smaller than the number of the Institutional Scholar Citation Profiles, because it is much more difficult for a university to get any TOP-10% most cited Scopus papers than to have its scientists set up their Institutional Google Scholar Citation profiles.

Since the scope of our study will include the scientific component of the Webometrics Ranking for universities representing large regional groups, it is worth mentioning that over its evolution, the ranking methodology has been moving towards increasing the weight of its scientific component, with the initial weight of only one research indicator (Scholar) out of four being 15%, and the current two research indicators out of the total three indicators of the Webometrics Ranking having a total weight of 50% (Openness (15%) and Excellence (35%)). All this brought the Webometrics Ranking much closer to such research-intensive rankings as ARWU, THE, QS, URAP, etc. Besides, this ranking has become on par with the above-mentioned research-intensive rankings, as in 2016 its methodology changed to include the bibliometric Excellence indicator mentioned earlier, weighing another 30%.

In our literature review below, we will be looking at the publications in which Webometrics Ranking was analyzed for the regional groups of countries, trying to identify the articles that discuss the scientific component of this ranking, with legitimate Google Scholar Citation profiles and Institutional Top 10% of most cited Scopus papers profiles.

Literature Review

The literature review to analyze the Webometrics Ranking for groups and sets of countries was performed in chronological order on the basis of all articles obtained through the Google Scholar search engine.

Szűts and László (2006) provided the distribution of Top-200 universities across the leading countries of the world in the Webometrics Ranking (2006, no date identified), with the total of 10500 university participating. For the first five countries, the distribution of universities was the following: USA – 56%, Germany – 8%, Canada – 8%, UK – 7%, Australia – 3%, Sweden – 3%, Netherlands – 3%, Switzerland – 2%, Japan – 2%, and others – 8%.

Aguillo et al. (2007) examined the Top-500 Latin American universities in the Webometrics Ranking (January 2007) to study rich files, a usual format for documents intended to be used as scientific or academic publications. These file types, as that study showed, are increasingly used by the Latin American leading institutions as a means for informal scholarly communication.

Rajesh and Nair (2008) studied the representation of universities from the leading countries in the Top-200 Webometrics Rankings as well as the number of the universities of the USA and Canada, Europe, Oceania, Asia, Africa and Latin America in the Top-200 and Top-500 in this ranking.

Ortega and Aguillo (2009) described the cross-country distribution of universities in the Top-1000 Webometrics Ranking (February 2008), listing only the first 15 countries. The United States (US) universities made up 36.9% of the entire sample, followed by the United Kingdom (UK) (6.8%) and Germany (6.6%). This distribution was also observed in the Top 200 of the ranking, which suggests that there is a digital divide in favor of US universities.

Aguado-López et al. (2009) presented a detailed distribution of universities across countries and continents according to the Webometrics Ranking (January 2007).

Kaya, Cetin and Sozeri (2010) studied the quantitative distribution of the universities across continents and countries in the Top-100, 200, 500, 1000 in the July 2009 edition of the Webometrics Ranking.

Barman (2011) examined the data from South Asian Top-100 Webometrics Ranking to compare the level of concordance (ranking agreements) and mirror images. The concordance and

mirrors images, made on the basis of paired rank correlations (Spearmans Rho) between the indicators of the Webometrics Ranking, reveal the direction of relationship of variables and finally induct the innovational cues to launch effective institutional websites in South Asia.

Like in Kaya, Cetin and Sozeri (2010), Aguillo (2012) distributed the universities across countries and continents for Top-100, 200, 500, 1000 Webometrics Ranking, but for a different period (July 2011). He also distributed all 19,403 universities ranked in the Webometrics Ranking across the continents.

Khosrowjerdi and Kashani (2013) analyzed the similar distribution of the leading universities of Japan, Australia, China, Hong Kong, Korea, Israel and Taiwan in the Top-200 QS, Shanghai, Webometrics, Leiden, THE, and HEEACT Rankings in 2010, revealing certain consistency among these international rankings. For example, some Spearman's correlations were found between QS-Webometrics rankings (Rho=0.78); QS-THE rankings (Rho=0.53); and Shanghai-HEEACT rankings (Rho=0.58). The highest correlation rate was recorded for QS-Webometrics (Rho=0.78). In 2010, Top-200 Webometrics Ranking included 14 Asian Universities with WR (World Rank) = 51–200 and the average rank of 117.5. At the same time, QS Rankings included much more Asian Universities – 42, with WR=80–196, and the average rank of 98.2. This suggests that Asian Universities in the 2010s paid little attention to their positioning in the Webometrics Rankings.

Moskovkin, Fraser and Moskovkina (2013) analyzed the representation of the Top-45 Webometrics Rankings (July 2010) of the leading Czech and German universities in the Top-1000 Webometrics Rankings, Top-200 THE, Top-500 ARWU, and Top-500 HEEACT Rankings. Further, Moskovkin et al. (2013) conducted a similar analysis of the representation of the Top-20 country university Webometrics Rankings in eight World University Rankings (Webometrics, THE, QS, ARWU, HEEACT, Leiden, URAP, SIR) for the Mediterranean and Black Sea region countries.

Barman (2013) examines and compares the data for South Asian Top-100, South East Asian Top-100 and Asian Top-100 Webometrics Rankings by calculating cross-correlation matrices for five indicators (World, Size, Visibility, Rich files and Scholar Ranks) and Spearmans Rho. While studying those three matrices, we noticed that the weakest correlations were observed between the Scholar Rank and the other three ranks of individual indicators. That study is comparable to a similar study of 2011 (Barman 2011).

In Moskovkin, Pupynina and Kamyshanchenko (2014), there was a matrix built for 29 countries of the Mediterranean and Black Sea region, showing the representation of the countries' TOP-20 in the world Top-1000, Top-2000 and Top-3000 Webometrics Rankings of the universities and

research centers. In the top positions, there were only the universities and research centers of Italy, Spain and France (January 2012).

Moskovkin et al. (2014) built a 9 by 49 matrix for 49 Sub-Saharan African countries by 9 indicators linked to the positioning of the countries in the Webometrics Rankings (Universities, OA-Repositories, and Research Centre), DOAJ, ROAR, QS, URAP, SIR, SCimago Journal & Country Rank (the data were collected in September 2013). That study showed that the leading countries with the highest number of their universities in the Webometrics Rankings were Nigeria (125 universities), Kenya (59), and Sudan (36).

Millot (2015) examined the Top-400 universities in the four major international university rankings – THE, QS, ARWU and Webometrics Rankings – and identified the first sets of five countries with the highest number and highest density of Top-400 universities in 2013. Among the countries with the highest numbers of Top-400 universities in the above rankings were only large countries: USA, Germany, UK, China, and Canada, as for the countries with the highest density of Top-400 universities that year, they were mostly smaller countries: Switzerland, Sweden, Denmark, Finland, and the Netherlands. The density of Top-400 universities is calculated as the number of Top-400 universities in a country weighted by the tertiary education – aged population of the country.

Bershadskaya, Voznesenskaya and Karpenko (2016) made a comparative assessment of the development of mass higher education in the regions and countries on the basis of the results of Webometrics Ranking (published in July 2015). The methodology used for that analysis was based on the comparison of the number of universities in the country/region included in several thousands of best universities in the world (6 indicators: N2000, N3000, N4000, N5000, N10000, N20000). The data on those indicators were collected for 19 leading countries of the world. Evaluation of the quality of mass higher education was made on a conditional parameter – the share of ranked universities in the country included in top 5000 (N5000) in the total number of ranked universities among 20,000 (N20000). By this indicator, the leading country was China. In general, assessment of the development of mass education in the regions showed the leadership of Asia by the number of universities among the world's best universities in samples from 3,000 to 5,000. In Top-2000, though, the leader was Europe, being far ahead of Asia and America.

Ati (2017) showed that in the World Webometric Ranking (July 2017) there were only 8 African Universities in the Top-1000 and 26 universities in the Top-2000 leading Universities in the world, which was due to low visibility and activity of lectors, researchers, students and institutions in African countries. Besides the analysis, O.F. Ati also provided some recommendations on how to improve some individual indicators for these universities in the Webometrics Ranking.

Madhoun and Hamouda (2017a) analyzed the performance of Top-100 universities in THE and QS Rankings, which were not present in the Top-100 of Webometrics Ranking, and likewise the Top-100 universities in Webometrics Ranking, which did not make it to the Top-100 of either THE or QS Rankings. The study found that impact was the main weakness of the universities in the Top-100 in THE, and QS Rankings, which were not present in the Top-100 in Webometrics Rankings. The number of external links had the main influence on the performance of those universities based on the impact indicator.

The study conducted by Madhoun and Hamouda (2017b) focused on analyzing and evaluating the Top-20 Arab World universities in the Webometrics Ranking (January 2017). Those universities were from seven countries: Egypt (7), Saudi Arabia (5), United Arab Emirates (3), Lebanon (1), Qatar (1), Kuwait (1), Oman (1), and Palestine (1), with only one university from the Arab World countries (King Saud University) being ranked in the Top-500 against 57 universities from Asia. Seven Arab Universities were ranked in the Top-1000, which count 3.5% of the Asian universities in Top-1000. Five Arab universities were present in the Top-500 of Webometrics Ranking by Presence indicator, and there were no Arab universities in the Top-500 by Impact indicator, whereas there were 81 universities from Asia ranked there. One and three Arab universities were ranked in the Top-500 of the ranking by Openness and Excellence indicators, respectively. King Abdullah University of Science & Technology had the highest number of Google Scholar Citations (279,205 citations) among other top Arab World universities.

Foster (2018) showed that the United States had 150 universities ranked in the Top-500, followed by Germany with 41, the UK with 38, Canada with 24 and Australia with 20 universities (Webometrics, July 2016 edition). At that time, there were only five universities from the MENA (Middle East and North Africa) region ranked in the Top-500 global universities of Times Higher Education World University Rankings (2017) and Webometrics Rankings (2016), and four of those were based in Israel, which was also the highest ranked nation state in the MENA region. So, except for only one university (King Abdulaziz University, Saudi Arabia), in Muslim countries of the MENA region there were no other world-class universities. As that study showed, the main reasons for that were the following: lack of investment in research and development, the absence of intellectual freedom, the failure to encourage, monitor and reward high-impact research and the anti-scientific mind-sets of the ruling political elites, of Islamic theologians and of those who are responsible for the supervision and administration of universities in the MENA region.

Torres-Samuel et al. (2018) examined the representation of universities from Latin America in ARWU, QS, SIR and the Webometrics Rankings. Comparatively, characteristics of each university are presented in terms of scope, volume of universities positioned and evaluation criteria. Regarding Latin America, Brazil leads with its presence in all the four above rankings.

There were more Latin American universities in QS (40%) and Webometrics (31%), whereas in the other two rankings, their share did not exceed 8%.

Vásquez et al. (2018) developed the Webometric analysis of Latin American universities started by Torres-Samuel et al. (2018), but it was further expanded by distributing the Top-100 of Latin American universities in the Webometrics Ranking by country (January 2017). That distribution for the leading countries was the following: Brazil – 43 universities, Mexico – 16, Chile – 12, Argentina – 11, and Colombia – 6.

Ayoub et al. (2019) conducted an analysis of the Top-5 of the SAARC nations (India, Pakistan, Bhutan, Nepal, Bangladesh, Sri Lanka, Afghanistan and Maldives) Country Web of Universities Ranking, providing the average World, Asian and Country Ranks for universities, as well as average Country values of ranks for individual indicators (Presence, Impact, Openness, Excellence). It was found that in terms of average values of World Rank, Asian Rank, country Impact and Openness Ranks, Indian universities were in top position, whereas by average values of Presence Rank Pakistan universities outperformed all other universities in the SAARC nations.

Torres-Samuel et al. (2019) presented the results of a descriptive analysis based on clusters of 85 Latin American universities located in the first fifty positions of ARWU, SIR, QS and Webometrics rankings, according to their most recent editions published during the year of 2019, highlighting the universities located in Brazil, Chile, Mexico, Argentina, and Colombia, countries that host 90% of the best positioned universities in Latin America. For instance, in Webometrics Ranking (July 2019), the distribution of the number of universities in Top-50 in the first cluster of universities was the following: Brazil – 28, Mexico – 8, Chile – 4, Argentina – 3, and Colombia – 3. At the same time the total number of universities from the leading Latin American countries out of 26 countries of the region was the following: Brazil – 170, Mexico – 73, Colombia – 36, Chile – 11, Peru – 9, and Argentina – 6, as was shown in Acosta-Vargas et al. (2020), in which there was also constructed a cross-correlation matrix for various webometric variables, including absolute values of Presences, Impact, Openness and Excellence indicators.

Torres-Samuel et al. (2020) demonstrated the positioning of Top-10 Latin American universities in ARWU, QS, SIR and the Webometrics Rankings (July 2019) and examined the dynamics of the SIR indicators over a decade interval (2009–2019).

Sarwar et al. (2021) examined the rank correlations between Webometrics Ranking and the QS, THE, and ARWU Rankings for the Top-30 universities of North America, Europe and Asia for the period of 2012–2016. There was a positive correlation found for North American and European universities, whereas for Asian universities the correlation was weak, which can be explained by the fact that Asian universities did not pay much attention to their websites unlike

the North American and European universities. It results in the overall higher positioning of North American and European universities when compared to Asian universities.

Faishol and Subriadi (2022), using the ADKAR (Awareness, Desire, Knowledge, Ability, Reinforcement) method, developed, in our opinion, the most exhaustive list of recommendations to improve the University Webometrics Ranking (75 recommendations in total).

Quire recently, Kipchumba (2022) studied the Top-15 universities in the world and compared them against the Top-15 African universities by all the indicators of the Webometrics Ranking (January 2021) in order to identify the reasons of a large gap between the African Universities and the leading world universities. The study made it possible to identify characteristic activities that allow a university to get ranked high in the Webometrics ranking and to provide some recommendations on how African universities can improve their Webometrics Ranking positioning to compete favorably against their global counterparts.

Perdomo et al. (2022) explored the clustering of universities from CIVETS countries (Colombia, Indonesia, Vietnam, Egypt, Turkey, and South Africa) in the Top-20 of the CIVETS Web of Universities Ranking in terms of World Rank and Presence (Impact, Openness, and Excellence) Rank. That study showed that the Top-20 of the CIVETS Web of Universities Ranking included one university from Colombia, one – from Egypt, two – from Indonesia, eight – from Turkey and from South Africa each. No universities from Vietnam were ranked in that version of the ranking.

Thus, the review of literature we have presented above shows that except for Madhoun & Hamouda (2017b), there have been no studies so far to consider the scientific component of the Webometrics Ranking for universities of sets of countries (Scholar indicator before 2016, and Openness and Excellence indicators after 2016). This is why we decided to carry out a detailed study of the scientific component of Webometrics Rankings under study for all universities of Asian countries.

Materials and Methods

The present study included all the universities from 46 Asian countries which were ranked in January and July 2022 Webometrics Ranking editions. These 46 countries were ranked by the number of universities ranked, along with indicating the interval of change in university ranks. Further, from this country-by-country distribution of universities, we excluded universities with neither legitimate Institutional Google Scholar Citation (Openness indicator) nor Institutional Top-10% most cited Scopus papers (Excellence indicator) profiles, and calculated their share of the total number of universities in Asian countries. By legitimate Institutional Google Scholar Citation profiles, we mean the profiles as described in the Webometrics Ranking methodology, e.g., if such a profile has fewer than 20 Personal Google Scholar Citation profiles, it is not

considered in the calculations. Or an Institutional Google Scholar Citation profile has more than 30 Personal Google Scholar Citation profiles, but the university is penalized for including the profiles of journals, departments, etc. in its institutional profile or for linking someone else's citations to personal profiles. Further, we will not always use the word legitimate with the term Institutional Google Scholar Citation profile.

The threshold (worst) values of Openness Rank (OR) and Excellence Rank (ER), at which Openness and Excellence indicators are not calculated, were as follows: OR = 7,420; ER = 7,190 (January 2022) and OR = 7,619; ER = 7,216 (July 2022).

Finally, for four Asian countries with the largest number of universities present in the Ranking (India, China, Indonesia, Japan), we constructed hundred-rank sequences of occurrence of universities without Institutional Google Scholar Citation (Openness indicator) and Top-10% most cited Scopus papers (Excellence indicator) profiles in Webometrics Ranking. This made it possible to see a generalized high-quality layer-by-layer (hundred-rank) structure of the university rankings of those countries from the point of view of their scientific component. Let us consider the following example. Suppose some country has 613 universities, then it has six hundred-rank intervals. Suppose in the Top-100 of the Country Webometrics Ranking, there are five universities from this country with no Institutional Google Scholar Citation (Openness indicator) profiles; in the next hundred-rank interval (Top 101-200), there are 56 universities from this country without such profiles; in the third interval (Top 201-300) – 95 universities; in the fourth interval (Top 301-400) – 100 universities, in the remaining two intervals, the country also has 100 universities each without Institutional Google Scholar citation (Openness indicator) profiles. Then, for the country under consideration, we can make up the following hundred-rank sequences of occurrence of universities without Institutional Google Scholar citation (Openness indicator) profiles in the form of members of this sequence: 5 + 56 + 95 + 100 + 100 + 13 = 469. Thus, the country under consideration has (469/613) x 100% = 76.5% of universities without Institutional Google Scholar citation (Openness indicator) profiles. Such hundred-rank sequences of occurrence based on summing their members are also constructed for universities without Top-10% most cited Scopus papers (Excellence indicator) profiles of the above four countries. At the same time, such generalized calculations as a percentage were made without constructing a hundred-rank sequences for the remaining 42 countries.

Results and Discussion

In Table 1, all 46 Asian countries are ranked in descending order according to the number of their universities in the January 2022 Webometrics Ranking, indicating the change in their World Rank (WR) interval. This table also shows the number of universities having no absolute values

of their Openness and Excellence indicators. A similar table was made for the July 2022 Webometrics Ranking (Table 2).

Table 1. Number of universities with no Institutional Google Scholar Citation profiles and no Institutional Top-10% most cited Scopus papers profiles (January 2022).

No	Country	Total number of universities	World Rank interval	Number of universities with no Institutional Google Scholar Citation profiles		Number of universities with no Institutional Top-10% most cited Scopus papers profiles	
				Abs	%	Abs	%
1	India	5,413	506-31,277	4,343	80.2	4,883	90.3
2	Indonesia	2,585	649-31,277	1,709	66.1	2,509	97.1
3	China	2,566	30-31,228	2,341	91.2	1,936	75.5
4	Japan	998	65-30,015	834	83.6	602	60.3
5	Iran	695	309-31,045	384	55.3	450	64.7
6	South Korea	374	109-31,033	285	76.2	245	65.5
7	Malaysia	368	400-31,097	301	81.8	322	87.5
8	Pakistan	359	913-31,060	229	63.8	261	72.7
9	Philippines	287	1,044-29,734	226	78.7	267	93.0
10	Turkey	212	518-30,065	27	12.7	92	43.4
11	Thailand	194	499-29,882	116	59.8	152	78.4
12	Vietnam	178	944-27,604	119	66.9	111	62.4
13	Bangladesh	170	1,589-29,961	101	59.4	93	54.7
14	Taiwan	164	150-25,314	105	64.0	64	39.0
15	Kazakhstan	130	983-31,243	112	86.2	113	86.9
16	Iraq	119	1,859-31,147	26	21.8	55	46.2
17	Afghanistan	95	5,705-31,033	92	96.8	88	92.6
18	Myanmar (Burma)	89	6,548-31,238	88	98.9	79	88.8
19	Uzbekistan	84	3,807-30,363	29	34.5	68	81.0
20	United Arab Emirates	70	983-27,332	42	60.0	28	40.0
21	Saudi Arabia	69	371-27,009	49	71.0	55	79.7
22	Sri Lanka	59	1,634-30,558	38	64.4	44	74.6
23	Mongolia	56	3,039-31,277	50	89.3	50	89.3
24	Israel	55	122-22,943	24	43.6	7	12.7
25	Yemen	50	4,430-31,266	43	86.0	37	74.0
26	Cambodia	50	4,840-30,212	48	96.0	45	90.0
27	Lebanon	46	719-29,388	37	80.4	26	56.5
28	Kyrgyzstan	45	4,532-30,969	43	95.6	37	82.2
29	Singapore	44	52-28,087	33	75.0	12	27.3
30	Syria	43	3,310-31,138	24	55.8	31	72.1
31	Oman	39	1,143-23,608	21	53.8	19	48.7
32	Jordan	36	903-23,996	8	22.2	8	22.2
33	Nepal	33	2,738 -28,509	24	72.7	25	75.8
34	Palestine	30	1,640-29,439	15	50.0	14	46.7
35	Tajikistan	28	5,492-30,310	27	96.4	26	92.9

36	Hong Kong	21	83 – 20,386	12	57.1	9	42.9
37	Qatar	16	768-27,612	12	75.0	4	25.0
38	Bahrain	14	1,917-27,332	8	57.1	4	28.6
39	Kuwait	13	1,850-20,647	6	46.2	4	30.8
40	Macau	10	735-20,637	6	60.0	4	40.0
41	Bhutan	10	5,548-26,182	9	90.0	9	90.0
42	East Timor	8	10,431-31,181	8	100.0	7	87.5
43	Brunei	7	2,814-21,766	5	71.4	5	71.4
44	Laos	4	4,811-29,574	3	75.0	2	50.0
45	Maldives	4	11,755-24,953	3	75.0	4	100.0
46	Turkmenistan	1	29,901	1	100.0	1	100.0

Table 2. Number of universities with no Institutional Google Scholar Citation profiles and no Institutional TOP-10% most cited Scopus papers profiles (July 2022).

No.	Country	Total number of universities	World Rank interval	Number of universities with no Institutional Top-10% most cited Scopus papers profiles		Number of universities with no Institutional Google Scholar Citation profiles	
				Abs	%	Abs	%
1	India	5,443	501-31,561	4,347	79.9	5,015	92.1
2	Indonesia	2,624	603-31,561	1,876	71.5	2,552	97.3
3	China	2,585	26- 31,437	2,238	86.6	1,956	75.7
4	Japan	999	64-30,372	823	82.4	612	61.3
5	Iran	461	295-31,477	312	67.7	308	66.8
6	South Korea	377	97- 31,463	288	76.4	249	66.0
7	Malaysia	370	327-31,374	306	82.7	324	87.6
8	Pakistan	366	848-31,243	232	63.4	268	73.2
9	Philippines	366	956-31,561	297	81.1	277	75.7
10	Turkey	212	542-31,054	26	12.3	74	34.9
11	Thailand	194	460-30,304	104	53.6	150	77.3
12	Vietnam	184	758-28,152	117	63.6	144	78.3
13	Bangladesh	171	1,468-30,635	100	58.5	93	54.4
14	Taiwan	164	145-23,517	101	61.6	63	38.4
15	Kazakhstan	132	944-31,374	114	86.4	116	87.9
16	Iraq	122	1,710-31,288	24	19.7	58	47.5
17	Afghanistan	97	4,987-31,245	94	96.9	90	92.8
18	Myanmar (Burma)	89	5,889-31,501	88	98.9	79	88.8
19	Uzbekistan	86	3,664-30,817	29	33.7	70	81.4
20	United Arab Emirates	71	956-27,852	40	56.3	31	43.7
21	Saudi Arabia	69	331-30,817	20	29.0	15	21.7
22	Sri Lanka	61	1,531-30,975	39	63.9	46	75.4
23	Mongolia	57	3,103-31,521	53	93.0	52	91.2
24	Israel	54	118-23,653	22	40.7	8	14.8
25	Cambodia	50	4,834-30,374	48	96.0	45	90.0
26	Yemen	49	4,271-31,480	43	87.8	35	71.4

27	Lebanon	47	713-29,935	36	76.6	30	63.8
28	Kyrgyzstan	45	4,335-31,338	42	93.3	39	86.7
29	Singapore	45	48-28,158	33	73.3	32	71.1
30	Syria	42	3,628-31,521	24	57.1	28	66.7
31	Oman	39	1,091-22,362	17	43.6	20	51.3
32	Jordan	37	784-23,882	7	18.9	9	24.3
33	Nepal	33	2,555-29,663	22	66.7	18	54.5
34	Palestine	30	1,651-30,549	14	46.7	14	46.7
35	Tajikistan	28	5,546-30,904	27	96.4	26	92.9
36	Hong Kong	21	78-20,954	12	57.1	9	42.9
37	Qatar	16	717-21,696	12	75.0	4	25.0
38	Bahrain	14	1,818-27,165	8	57.1	4	28.6
39	Kuwait	13	1,976-21,830	6	46.2	5	38.5
40	Macau	10	607-20,871	7	70.0	3	30.0
41	Bhutan	10	5,149-23,462	9	90.0	9	90.0
42	East Timor	8	9,394-31,338	8	100.0	7	87.5
43	Brunei	7	2,721-20,954	5	71.4	5	71.4
44	Turkmenistan	6	17,318-30,896	6	100.0	6	100.0
45	Maldives	5	11,051-24,769	4	80.0	5	100.0
46	Laos	4	4,814-29,663	3	75.0	2	50.0

The country ranks by the number of their universities present in the Webometrics Rankings hardly changed over a six-month period (up to the 43rd place they remained unchanged). In terms of the quantity, the changes were insignificant, except for Iran and the Philippines. As for Iran, the number of its universities dropped from 695 to 461, whereas the Philippines saw an opposite trend – the number of its universities increased from 287 to 366. In the first case, a large number of Iranian universities and colleges had to face various penalties imposed on them; on the contrary, about 80 new Philippine colleges were included in the Ranking.

In these two tables, we can see all the Asian countries that had their universities in the 2022 Top-100 Webometrics Ranking – China, Hong Kong, Singapore, Japan (January edition) plus South Korea (July edition); the same countries plus Taiwan, Israel were ranked in the Top-200 Webometrics Ranking (January and July editions); all the countries from Top-200 plus Iran (July edition) were ranked in the Top-300 Webometrics Ranking; Top-400 Webometrics Ranking included all the countries from Top-300 and also Malaysia, Saudi Arabia, etc.

The varying change values of the number of universities without Institutional Google Scholar citation profiles over a six-month period across countries significantly exceeds the similar varying change values for the number of universities without Institutional Top-10% most cited Scopus papers profiles, which is due to the obvious greater stability of the latter.

The first 20% of countries (9 countries) in Tables 1 and 2 (See above) in all four distributions account for 88–89% of the total number of profiles in question. Therefore, these distributions are somewhat different from the Pareto distribution.

Now let us look at Tables 1 and 2 for number of universities with no absolute values of the Openness and Excellence indicators. As for the first indicator (Openness), Turkey is the leader (with an average of 12.5% in 2022) and Jordan (with an average of 20.6% in 2022), which have the lowest shares of universities without absolute values of this indicator. This suggests that managers and researchers from universities in these countries are trying to support their Institutional and Personal Google Scholar Citation profiles. If in Table 2 we look at the countries with over 50 universities present in the Ranking, we will see that Israel, Saudi Arabia, Taiwan and Turkey have the best positions by the second indicator, for these countries the share of universities in question varies from approximately 15% to 38%.

It is of interest to see how the numbers of universities in question – without Institutional Google Scholar Citation (Openness indicator) and Top-10% most cited Scopus Papers (Excellence indicator) profiles – change at successive hundred-rank intervals. For this, for four countries with the largest numbers of universities (India, China, Indonesia, and Japan), we made hundred-rank sequences of occurrence of the number of universities without Institutional Scholar Citation (Openness indicator) and Top-10% most cited Scopus papers (Excellence indicator) profiles in Webometrics Ranking for two time periods (Table 3).

Before analyzing the dynamics of the numbers of universities with no values for the indicators in question in hundred-rank intervals, we suggest looking at the generalized data on these indicators in Tables 1 and 2 for the first four countries and comparing them for different time periods and across the countries.

Over a six-month period under study, the numbers of universities with no Institutional Google Scholar Citation (Openness indicator) profiles considerably changed for Indonesia (increased by 5.4%) and China (decreased by 4.6%), whereas for India and Japan, the changes were insignificant (no more than 1.2%).

For all four countries over the same six-month period, the numbers of universities with no Institutional Top-10% most cited Scopus papers (Excellence indicator) profiles hardly changed (changes did not exceed 2%). The best situation with this indicator was observed in Japan (about 60-61% of universities with no values of this indicator), and the worst – for Indonesia (about 97% of universities with no values of this indicator) (See Table 3).

Openness indicator for India in hundred-rank intervals is tending to 100, which occurred at the 32nd interval (WR = 3,200) in January 2022 and at the 35th interval (WR = 3,500) in July 2022. A similar situation was observed for Indonesia, whereas for China and Japan such transitions are observed as happening much earlier, within WR = 400-500

As for Excellence Indicator, we can see that for India the first 300 Indian universities had Institutional Top-10% most cited Scopus papers profiles (in Table 3, you can see three

consecutive "zeros"), for China, the first 600 universities (January 2022) had such profiles, for Japan almost all first 300 universities had such profiles, and for Indonesia, in the first hundred-rank intervals of universities only 74 (100-26 = 74, January 2022) and 71 (100-29 = 71, July 2022) universities had such profiles.

Table 3. Hundred-rank sequences of occurrence of the numbers of universities without Institutional Google Scholar Citation (Openness indicator, OI) and Top-10% most cited Scopus papers (Excellence indicator, EI) profiles in Webometrics Ranking for selected Asian countries

India	
January 2022, N = 5,413	July 2022, N = 5,443
OI:0+10+32+44+16+17+22+32+42+41+54+61+76+68+74+84+86+81+81+87+86+93+86+93+96+94+98+94+94+92+96+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+13 =4,343 EI:0+0+0+27+84+89+93+92+97+99+97+100+99+97+97+99+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+13=4,883.	OI:3+14+29+46+19+19+29+26+40+54+54+61+64+71+66+79+80+78+86+80 +86+90+91+95+96+91+93+93+93+95+96+98+97+97+99+100+100+99+98+99+100+100+100+100+100+100+100+100+100+100+100+100+ 100+100+43 = 4,347 EI:0+0+0+30+83+87+90+96+97+97+98+99+99+100+100+99+99+98+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100++100+100+43=5,015
China	
January 2022, N=2,566	July 2022, N=2,585
OI: 0 + 5 + 80 + 100 +100 + 100 + 92 + 100 + 98 + 100 + 100 +100+100+ 100+100+100+100+100+100+100+100+100+100+100+100 + 66 = 2,341 EI: 0 + 0 + 0 + 0+ 0 +0+ 72 + 100 + 99 + 99 + 100 + 100 +100+ 100+100+100+100+100+100+100+100+100+100+100+100+66 = 1,936	OI: 0 + 2 + 62 + 99 +100 + 98 + 93 + 99 + 100 + 100 + 100 +100+100+ 100+100+100+100+100+100+100+100+100+100+100+100 + 85 = 2,238 EI: 0 + 0 + 0 + 0+ 0+2 + 72 + 97 + 100 +100 + 100 + 100 +100+ 100+100+100+100+100+100+100+100+100+100+100+100+85 = 1,956
Indonesia	
January 2022, N=2,585	July 2022, N=2,624
OI:36+35+32+32+34+43+45+38+48+62+71+78+86+93+96+100+95+99+100+100+100+100+100+100+100+85 =1,709 EI:26+99+99+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+85 = 2,509	OI:34+31+33+30+36+31+45+32+50+52+61+66+84+88+97+97+96+98+99+98+99+97+98+100+100+100+24 =1,876 EI:29+99+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+100+24 = 2,552
Japan	
January 2022, N = 998	July 2022, N = 999
OI: 0 + 42 + 94 + 100 + 100 +100+100+ 100+ 100+98 = 834 EI: 0 + 0 + 1 + 25 + 78+ 100 + 100 +100+100+98 = 602	OI: 0+31+95+98+100 +100+100+100+100+99 = 823 EI: 0+0+2+29+82+100+100+100+100+99 = 612

When comparing the dynamics of Openness Indicator and Excellence Indicator in hundred-rank intervals for certain countries, we can see that the leading Chinese universities show more interest in creating Institutional Top-10% most cited Scopus papers profiles than Institutional Google Scholar Citation profiles. For instance, in January 2022, in the fourth, fifth and sixth hundred-rank intervals (WR = 400-600), all the Chinese universities had the Institutional Top-10% most cited Scopus papers profiles, at the same time none of them had Institutional Scholar Citation profiles (see Table 3).

This is a serious drawback of research management at Chinese universities that are more ARWU-oriented and by ignoring Webometrics Ranking, they miss the fact that Institutional Google Scholar Citation profiles improves the visibility of the publications by Chinese scientists, and, as a result, their citation in Scopus & Web of Science journals. And this, in turn, improves the ranking positions of universities in ARWU, THE, and QS Rankings.

Such imbalances are less pronounced for Japan. A different strategy is applied by universities of India and Indonesia, which find it difficult to compete with Chinese and Japanese, as well as Western universities. We can see that Indian universities with Institutional Google Scholar Citation profiles were present in the 31st hundred-rank interval (WR = 3,000-3,100) of universities in January 2022 and in the 40th hundred-rank interval (WR = 3,900-4,000) in July 2022. As for Indonesia, in July 2022 we could see universities of this country with such profiles in the 23rd hundred-rank interval (WR = 2,200-2,300) (see Table 3).

To understand the reason for Asian universities not having legitimate Institutional Google Scholar Citation profiles when Webometrics Rankings are calculated, we studied the new calculations of these rankings in July 2023, with the threshold (worst) values of Openness Rank (OR) and Excellence Rank (ER), at which calculations of Openness and Excellence indicators are not carried out, being as follows: OR = 8,183; ER = 7,237. By analogy with Table 3, we have made up four sequences for the first four hundred-rank intervals:

India, OI: 1 + 14 + 33 + 36; China, OI: 0 + 0 + 31 + 98; Indonesia, OI: 27 + 17 + 21 + 30; Japan, OI: 0 + 31 + 92 + 96.

From these sequences we can see that, when compared to July 2022 (See Table 3), they have transformed most for the first three countries. Then, we tested all illegitimate profiles of these sequences and discovered the following patterns:

1. Indian illegitimate Institutional Google Scholar Citation profiles are characterized by the presence of a large number of Personal Google Scholar Citation profiles, but the latter very often contain profiles of journals and departments, as well as Personal Google Scholar Citation profiles with fake citations, with few profiles with a small number of researchers (under 20);

2. Chinese illegitimate Institutional Google Scholar Citation profiles are characterized by incomplete Personal Google Scholar Citation profiles with the number of researchers fewer than 20.
3. Indonesian illegitimate Institutional Google Scholar Citation profiles have the same features as those of India, but besides the profiles of departments and journals, they include the profiles of scientific programs and projects, scientific teams and laboratories;
4. Japanese illegitimate Institutional Google Scholar Citation profiles are similar in their features with Chinese ones.

Thus, we can see that Chinese and Japanese universities do not prioritize Webometrics Ranking, but rather focus on ARWU Ranking, which is why researchers at those universities are incentivized exclusively to publish in journals indexed in the Web of Science. By contrast, researchers at Indonesian and Indian universities target Webometrics Ranking, but their scientific management does not provide them with an explanation as to how to create Personal Google Scholar Citation profiles properly, so that they are not to the detriment of Institutional Google Scholar Citation profiles.

Conclusion

By studying the evolution of the Webometrics Rankings methodology, we can see that it has shifted towards assigning larger weights to university research indicators, more precisely, to publication activity and citation. Originally, only one indicator (Scholar, weighing 0.15) out of four measured research activity, whereas now the methodology includes two indicators (Openness, Excellence, with a total weight of 50%) out of total three which are used to measure university research.

It is worth pointing out that if originally all the indicators of this ranking were webometric and the ranking itself was aimed at assessing university web sites, gradually the ranking team introduced a heavyweight Excellence indicator, which is based on hard statistics of the top cited papers provided by SCimago Lab over the last five years. Obviously, the introduction of this indicator places Webometrics Rankings alongside the leading traditional university rankings (QS, THE, ARWU, TNU, URAP, Leiden). Moreover, the Webometrics Ranking team shortly after the introduction of the Excellence indicator announced on their website: “The Ranking Web is not a ranking of the websites of universities, it is a Ranking of Universities. It uses both webometric (all missions) and bibliometric (research mission) indicators”.

As mentioned earlier, there is a fairly good ranking correlation between Webometrics Rankings and a number of other leading university rankings, and this correlation is better in those countries and regions of the world where more attention is paid to open publications by university scientists. Therefore, our comparative analysis is very important, as it examines the

universities of one of the largest regions of the world, Asia, with increasingly active research, in terms of how their scientists use open-access technologies (OA-repositories, OA-journals) that contribute to the creation of their Google Scholar Citation profiles, as well as their publications in high impact factor journals.

Our study looked into the behavioral strategies of universities and researchers from China, Japan, India and Indonesia, the countries with the largest numbers of universities, in terms of creating and maintaining Institutional Google Scholar Citation profiles. The universities and researchers from China and Japan are shown as not targeting Webometrics Ranking, unlike the universities and researchers from India and Indonesia, which, notwithstanding this orientation, generate a lot of illegitimate Institutional Google Scholar Citation profiles.

The results of the study show that quite a few universities in Asian countries pay enough attention to the creation of the legitimate Institutional Google Scholar Citation profiles. Only three countries, Turkey, Jordan and Iraq pay a lot of attention to this issue. Besides, Turkey and Saudi Arabia, as well as Israel and Jordan, have achieved the best results with creating Institutional Top-10% most cited Scopus papers profiles of their universities.

We believe that the results we have obtained will be of use to the research management of universities in Asian countries, as well as to the ministries of science and higher education in these countries, so that they could adjust their development strategies to increase competitiveness of their university systems on the global academic arena by involving more training measures and incentives.

Author Contributions

Vladimir M. Moskovkin – conceptualization, methodology, formal analysis and original draft preparation; Olesya V. Serkina – calculation and visualization, data curation, review and editing.

Data Availability Statement

All data generated or analysed during this study are included in this published article.

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Ethical considerations

No ethical approval is required as the study did not involve any human participants.

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