Original Article

The predictability of QS ranking based on Scopus and SciVal data

KOME − An International Journal of Pure Communication Inquiry
Volume 10 Issue 1, p. 47-58.

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Published by the Hungarian Communication Studies Association
DOI: 10.17646/KOME.75672.85

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Abstract: The use of international university rankings is an internationally recognized way of evaluating higher education systems and institutions. The QS ranking is one of the best-known among them, and it ranks institutions along six indicators. This study has two objectives. We first examine how the QS ranking and the university rankings derived from the variables obtained from the Scopus/SciVal database by the TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) ranking procedure relate to each other. We find that the QS ranking and the ranking obtained with the Scopus/SciVal data show strong similarity. The second goal was to test the place of the countries on the ranking. A comparison of universities from countries on the QS ranking led to the conclusion that the top-ten ranked countries were mainly smaller Western European countries as well as two city-states from the Far East. Our analysis can be considered somewhat unique as the method for calculating the data determining the QS rankings is not always available on the QS website, so the ranking cannot be repeated. In addition, the ranking results are only available once a year, so only the results of the most recent QS measurement are available between the two dates.

Keywords: University ranking, TOPSIS, Scopus / SciVal

Introduction

Higher education plays an increasingly important role in the economic growth and social development of individual nations (OECD, 2015). Higher education institutions are increasingly prominent players in terms of knowledge production and sharing as well as innovation potential (El Gibari et al., 2018). Their activities and performance—like other industries and human activity in general—are constantly measured and monitored. The now accepted and internationally recognized form of this is the use of international university rankings. These rankings have also become the center of attention for science policy at the national level, and for governments and students facing further education choices, as well as

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Article received on the 8th April, 2021. Article accepted on the 19th February, 2022.
Conflict of Interest: The authors declare no conflict of interest.

the media (Johnes, 2018). At the same time, we can see how higher education institutions strive to meet the measure of "excellence" defined by these relative performance measurement tools (the institutions are compared to each other), often significantly transforming their mission and scope of activities (Daraio et al., 2015).

The three major international university rankings and their indicators

Three rankings stand out internationally, providing a strong reputational source for the universities listed. These are global rankings focusing primarily on research performance rather than education. The world's leading universities are annually scored and ranked on these global rankings, namely UK's Times Higher Education (THE) World University Rankings, Quacquarelli Symonds' (QS) World University Rankings starting in 2004, and Academic Ranking of World Universities (ARWU) starting from 2003. These rankings show slight differences in terms of the indicators they use for measuring overall academic performance.

Table 1. Indicators and Weights for QS, THE and ARWU

Num-ber	**QS World University Rankings–Methodology**		**World University Rankings (THE)–Methodology**	
	Metric	**% weigh-ting**	**Metric**	**% weigh-ting**
1	Academic Reputation	40	Teaching	30
2	Employer Reputation	10	Research	30
3	Faculty/Student Ratio	20	Citations	30
4	Citations per faculty	20	International outlook	7,5
5	International Faculty Ratio	5	Industry income	2,5
6	International Student Ratio	5		
	ShanghaiRanking's Academic Ranking of World Universities Methodology (ARWU)			
1	Alumni of institution winning Nobel Prizes and Fields Medals			10
2	Staff of an institution winning Nobel Prizes and Fields Medals			20
3	Highly Cied Researchers			20
4	Papers published in Nature and Science			20
5	Papers indexed in Science Citetion Index Expanded and Social Science Citation Index			20
6	Per capita academic performance of an institution			10

Source: QS World University Rankings – Methodology, World University Rankings 2022: methodology, https://www.shanghairanking.com/methodology/arwu/2021

Following the overview of the chosen rankings' indicators, we should compare them in order to put them in context. The most important difference between these rankings is where they gather their bibliometric data from that are related to research performance indicators. The QS and THE rankings are based on the Scopus, while the ARWU is based on the Web of Science. Marginson (2005) points out that the ARWU is the most numeric ranking using a very simplified, research performance oriented and transparent methodology. In parallel with this, the QS and THE rankings take a wider variety of aspects into account, also measuring the prestige of a given university through questionnaires, the quality of education, as well as relations with industry. Due to the methodological background, the ARWU ranking is more suitable for STEM (science, technology, engineering and mathematics) oriented universities, while the other two are good benchmarking tools for universities identifying their primary profile in the field of social sciences and arts and humanities. Nevertheless, studies found significant correlations and similarities between the ranking results (Shebatta & Mahmood, 2016; Aguillo et al., 2010).

Indicators used for measuring the impact of research in the rankings

The research pillar is a constituent element in all of the three major international rankings, however, they are presented to a varying degree and measured by using different indicators. The QS and THE rankings incorporate research pillars not only by bibliometric data but also by applying surveys or questionnaires. In the QS ranking, two of the indicators deal with the research performance: academic reputation measured by survey which accounts for 40 percent of the total score, and the citations per faculty, which is measured by the total number of citations received by all papers produced by a given institution throughout a five-year period divided by the number of faculty members at that institution. As there are significant differences regarding the number of citations among the disciplines, the QS ranking uses normalized citation numbers (QS Top Universities, 2021). The THE ranking calculates the research output within two of its pillars, namely the research accounting for 30 percent of total score and the citations pillar accounting for 30 percent of the total score. The research pillar includes the indicators of reputation survey, research income, and research productivity, while the citations pillar includes the citations indicator. The ARWU ranking is mostly centered around measuring research performance, focusing on the bibliometric data, incorporating the indicator of quality of faculty, which is based on the number of Nobel Prizes awarded and Fields Medallists faculty members, highly cited researchers, and the research output based on the number of papers published in the Nature or Science journals, and the number of papers listed in the Web of Science Citation Index-expended or the Social Sciences Citation Index. These indicators combined together account for 80 percent of the total score.

Of the three main missions: research, education, and industrial knowledge sharing (Laredo, 2007), international rankings focus primarily on research, and thus clearly promote the strengthening of the research aspect in the profile of institutions. The emphasis being put on the research pillar is also observed by Demeter (2019) who investigates academic productivity and academic capital, stating that peer-reviewed articles have become the most significant "currency of business".

Predicting the positions in the QS World University Rankings

In our study, our aim is to investigate the QS World University Rankings from the perspective of the research output of the institutions measured.

As it has been demonstrated in the tables presenting the methodology of the rankings, in the QS ranking, academic reputation accounts for 40 percent of the total score, followed by 20 percent for the faculty/student ratio, 20 percent for citations per faculty, 10 percent for employer reputation, 5 percent for international student ratio and 5 percent for international staff ratio. This shows that a total of 60 percent is directly related to the research output of the university. Our research question was triggered by Johnes' (2018) study, which examines the varieties of indicators used by the different national and global university rankings. He points out the difficulties of getting a consistent overview on the universities' performance from a set of very different indicators. He builds this statement on the 10 indicators of The Complete University Guide (2018), including the entry standards, student satisfaction, research assessment, research intensity, graduate prospects, student-staff ratio, academic services spending, facilities spending, good honours and degree completion. He proves that although the majority of indicators are highly correlated, there are 12 pairs which do not correlate at a conventional level of significance. This leads to the consequence that it is important to pay attention to the indicators in which a given university stands out with high scores, because they do not necessarily reflect the good teaching or research performance of the university. According to Johnes' results, universities reaching high scores in soft indicators such as employer reputation would reach high positions in the ranking even without reaching high scores in other indicators such as citations per faculty.

As a reflection to the problem brought up by Johnes, we offer a thought experiment and an analysis closely related to it. We ask whether it is possible to carry out an analysis that is able to predict the final positions of universities in the rankings to a reliable degree even before they are officially published. If so, how accurate can it be? Our choice has fallen on the QS World University Rankings for two main reasons. The data obtained for our analysis should be identical to the dataset used by the official QS rankings in order to fulfil the requirement of comparability, even if we know that the exact calculation algorithm is not available. As we have full access to the services of Scopus/SciVal, it seemed to be the most reasonable option. The other reason is that this ranking seems to be the most promising to put Johnes' results to the test, as the QS World University Rankings contains the highest share of soft indicators. In other words, our aim is to examine how accurately the final, official ranking can be predicted, leaving soft indicators out of the equation and solely concentrating on research and citation data. Thus, our analysis deals with the publication activity and citation metrics related to the six pillars.

In the paper, we investigate several questions, most importantly whether we can predict the QS ranking based only on the data extracted from the SciVal software. Besides this, we analyze the accuracy of this prediction, as well as to what extent the accuracy of the prediction depends on the raw data or ratios. In our paper, we assume that the data obtained from the SciVal software allow us to establish the ranking of the universities. Demeter (2018) in his paper emphasizes the internationally recognized journal lists – including the Scopus and by this indirectly the SciVal being a database built upon raw data originating from the Scopus – are key influencers of the university rankings. As we made a reference to it above, the QS World University Rankings calculates its research output pillar based on the Scopus database, so universities target to reach high scholarly output indexed in this database to arrive in higher ranks. This guarantees them better chance to attract talented international students and the best performing scholars. Demeter and Tóth (2021) state that research intensive universities gain their reputational capital through their research output indexed in internationally recognized citation databases including Scopus. Considering the role of research output regarding the rankings, we assume that publishing activity and its impact may also properly approximate university rankings with the rest of the pillars not taken into account. To prove this, we use university-specific data from the already mentioned SciVal database. We only examine universities that are included in the QS 2021 list.

The ranking established from the publication data was calculated using the TOPSIS method, based on two selected six-variable databases. For the sake of comparability, we had to break down the QS ranking between universities with the same rank, for which we took these institutions into account with the average of their ranks.

After these introductory chapters, the next chapter discusses the process of database compilation. We then compare the TOPSIS rankings obtained from the two six-variable databases (raw data and the ratio) and compare the three rankings with Kendall's τ-b rank correlation. In the last part, following the analysis on the two databases, we review the positions of the countries in the ranking.

Compilation of databases

We set out to work by compiling the database. We used basic variables in the analysis, 5 of which were taken from the SciVal database, while the sixth was taken from the official websites of the examined institutions. Our variables, and our raw data show the status as it was in 2019. The basic variables extracted from SciVal are:

- number of publications (*PUBL*),
- number of citations (*CIT*),
- number of authors (*AUT*),
- the five-year Hirsch index between 2015 and 2019 (*H5-I*) and
- the Field-Weighted Citation Impact (*FWCI*).

The field-weighted impact *(FWCI)* indicator shows the citation attractiveness of the publications from researchers working at a given university in a summarized form. FWCI is suitable for measuring the citation attractiveness of publications both in similar and different discipline areas because it shows a normalized value. FWCI is only available in the Scopus and SciVal databases, a value above 1 indicates that the citation attractiveness of a given publication is higher than other publications that provide a basis for comparison. A description of the indicator can be found in studies by Elsevier (2019) and Purkayastha et al. (2019).

The sixth variable, which refers to the staff of the institutions, was extracted from the official website of the QS ranking. As the authors of the publications do not necessarily teach, or vice versa, many lecturers also do research, we also determined the number of professionals employed by a university:

- the total number of teaching and research staff (*AFS*).

We used these six variables and indicators as the starting point of our study. For further examinations, we created six ratios along the basic variables, which are as follows:

- proportion of authors to all teaching and research staff (*AUT / AFS*),
- number of publications per author (*PUBL / AUT*),
- number of citations per author (*CIT / AUT*),
- number of citations per publication (*CIT / PUBL*),
- the number of publications per lecturer or researcher (*PUBL / AFS*) and
- number of citations per lecturer or researcher (*CIT / AFS*).

The newly-introduced variables are seen as relative indicators. Three of them show the weight of the citations per researcher as well as per publications. The remaining three indicators illustrate publications for researchers and faculty. Thus, these indicators summarize the attractiveness of the citations and the proportion and effectiveness of the research staff.

Using the two databases (basic variable and ratio-based), we formed two rankings and examined how the resulting rankings related to the QS 2021 indicator. It was also necessary to determine the missing values for our analysis. Missing values were calculated using the SPSS26 program. The SPSS program offers several methods for calculating the missing value; we chose the method in which the system takes the mode of the top and bottom value of the nearest missing value. We were able to use this method because the examined institutions had already been in the ranking according to QS ranking indicators.

Comparison of the QS 2021 ranking and the rankings determined based on basic data and ratios

The TOPSIS method was used to determine the ranking based on basic data and ratios. We used the version of the TOPSIS method which determines weights endogenously from the data. In other words, this is the entropy-based method of weight determination. The methodology of the actual calculation is briefly presented below.

The TOPSIS ranking procedure first normalizes the available basic data. The purpose of normalization is to eliminate size differences between each criterion. There are several methods for normalization, for instance transforming the data to [0,1] intervals or shortening them to a circle with a unit radius, that is, the Euclidean distance with a unit radius. The normalized decision matrix is then weighted with a weight vector. In order to select the weight vector, there are three basic methods to choose from: subjective weight given exogenously, objective weight derived from the decision matrix, and finally an integrative method achieved by combining the former two methods. In our case, we chose weights by finding the objective weight. In the course of finding the objective weight, the criteria are multiplied by the weights first, then we determine the best or ideal point in the space of the criteria for each criterion in the new matrix, and the anti-ideal or nadir point. We then determine the distance from each ideal and nadir point for each decision-making unit (DMU). If a DMU is close to the ideal point, its distance from that is close to zero, while its distance from the nadir point will then be close to the distance of the two awarded points. The essence of the method is that the two distances form a quotient. If the DMU is close to one, it is considered good, whereas if the DMU quotient is close to zero, it will fall to the nadir point. close to the DMU.

In the first step, we normalize the basic data. Let us assume that the data for variable *i* for each university are contained in the vector $\mathbf{x}_i$. Data transformation is as follows:

$$y_{ji} = \frac{x_{ji} - x_j^{min}}{x_j^{max} - x_j^{min}}, \quad (j = 1,2,\dots,n;\ i = 1,2,\dots,m),$$

where the minimum and maximum values of the variable *i* are x_j^{min} and x_j^{max}, *n* is the number of universities and *m* is the number of variables/criteria. With this transformation, the values of each variable are converted to a [0,1] interval per university. Let $\mathbf{y}$ be the value of the new vectors.

In the *second step*, knowing the values of each variable, we use the entropy-based method to determine the weights of the variables (Zou et al., 2006). The equation for the transformation is as follows:

$$H_i = \frac{-1}{ln(n)} \cdot \sum_{j=1}^{n} \frac{y_{ji}}{\sum_{j=1}^{n} y_{ji}} \cdot ln\left(\frac{y_{ji}}{\sum_{j=1}^{n} y_{ji}}\right), \quad (i = 1,2,\dots,m).$$

Thus, the weights are as follows:

$$w_i = \frac{1 - H_i}{n - \sum_{i=1}^{m} H_i}, \quad (i = 1,2,\dots,m).$$

The weighted normalized values are represented by z_{ji}, which are: $z_{ji} = w_i \times y_{ji}$. The ideal and lowest points are then determined using the z_{ji} values.

Finally, in the *third step*, we determine the efficiency index based on the weighted data using the ideal (I_i) and lowest (N_i) points, which are calculated as follows:

$I_i = \max_{j=1,2,\dots,n} z_{ji}$, $N_i = \min_{j=1,2,\dots,n} z_{ji}$, $(i = 1,2,\dots,m)$.

The distance of university j from the ideal and the low point is determined as follows:

$d_j^I = \sqrt{\sum_{i=1}^{n} (z_{ji} - I_i)^2}$, $d_j^N = \sqrt{\sum_{i=1}^{n} (z_{ji} - N_i)^2}$, $(j = 1,2,\dots,n)$.

Finally, the last calculation determines the efficiency of TOPSIS E_j, which shows the ratio of the distance from the two defined points:

$E_j = \frac{d_j^N}{d_j^I + d_j^N}$, $(j = 1,2,\dots,n)$.

After a brief description of the TOPSIS method, we present the results of the calculations performed on the data set. The detailed calculations are beyond the size limits of the present study, therefore it is not possible to discuss them in detail. Objective weights are presented in the two tables below (Tables 2 and 3).

Table 2. TOPSIS weights of the model calculated using basic data

	PUBL	*CIT*	*AUT*	*H5-I*	*FWCI*	*AFS*
Weights	0.165	0.166	0.171	0.166	0.166	0.166

Source: Our own editing based on SciVal data

Table 3. TOPSIS weights of the model determined using ratios

	AUT/AFS	*PUBL/AUT*	*CIT/AUT*	*CIT/PUBL*	*PUBL/AFS*	*CIT/AFS*
Weights	0.168	0.159	0.167	0.170	0.167	0.169

Source: Our own editing based on SciVal data

The three rankings for all the 1003 universities in the QS ranking can be found in the appendix to this study.

Our calculations are carried on by comparing the three rankings using Kendall τ-*b* correlation. This correlation measures the relationship between variables measured on the ordinal scale. The calculation process of this correlation is based on the Kemény distance. (Kemény, 1959) Kendall τ-*b* correlation between the three rankings for the 1003 universities is shown in the table below (Table 4). The QS Rankings 2021 Ties list shows the resolution of the original QS ranking, where in the case of ties, the indeterminable ranking is substituted by the average of the sum of the ordinal numbers of the tied universities. It is considered to be a proven method of ordering.

Table 4. Kendall correlation between the three rankings

Kendall τ-b correlation		**TOPSIS basic data**	**TOPSIS ratios**
QS ranking 2021 Ties	Correlation coefficient	**0.477****	**0.427****
	2-sided significance	0.000	0.000

TOPSIS basic data	Correlation coefficient		**0.677****
	2-sided significance)		0.000

** 2-sided significance 1%

Source: Our own editing based on SciVal data

In Table 4, it can be observed that the correlations are greater than 0.35, which means that there is a strong correlation, in our case an association, between the three rankings. Although the level of correlation between the TOPSIS rankings obtained from the two databases is not particularly strong, it is significant enough not to be ignored. The overall result is not surprising since the ratios were determined with the data of the basic variables. Having examined the correlations, it is worth taking a look at the positions the countries achieved in each ranking to see whether a similar degree of correlation can be determined.

Positions of countries on the QS lists

Sidorenko and Gorbatova (2014) begin their study with the statement that international university rankings not only measure success but also introduce a huge challenge to higher education players and nations in the pursuit of a better rank. With these performance rankings not only higher education institutions but also entire national higher education systems become measurable, comparable and transparent. In order to establish how accurately this can be done using our method for measurement, we decided to examine the overall ranking of universities in various countries. As it was previously noted, only universities in the QS 2021 list were examined. As a consequence, only those countries were taken into consideration in this part of our analysis that represented themselves in the list by delegating universities to it. First, we examined the average of the rankings of universities in each country by comparing the averages. Our null hypothesis (H0) was that the average of the rankings of the universities of the countries is the same, that is, there is no difference between the universities of the countries. Using the Compare Means tab in the SPSS 26 software, we obtained that our null hypothesis (H0) was not satisfied, meaning that the average of the rankings of the universities of the countries in order is not equal. With this, we accepted hypothesis H1. This result made it possible to compare the means of the three rankings.

Table 5 shows which rankings are on the list. QS Rankings 2021 shows the official ranking given by QS-R. We had to resolve this for all universities because all institutions were tied on the list with other universities. This resolution is contained in the QS Rankings 2021 Ties column. The QS-RD column shows the ranking obtained with the basic data, while the QS-RE column shows the ranking obtained with the ratios. Since the chance of a tie is small with TOPSIS, the positions of the institutions in the ranking calculated with this method are clear. Table 4 also shows the average rank of universities of countries and the three rankings. The average order of the universities in each country was then put in order, which is after the three averages. Finally, we formed the average of the orders, which was then also ranked. This was placed in the last column of Table 5.

Table 5. Positions occupied by the countries in the ranking

Countries	QS-R		QS-RD		QS-RE		Average	Rank	Number of universities
Netherlands	168.385	2	189.77	2	143.92	4	2.67	1	13
Denmark	197.000	6	134.40	1	130.40	2	3.00	2	5
Switzerland	195.950	5	215.60	6	136.60	3	4.67	3	10
Sweden	193.000	4	214.88	5	168.75	5	4.67	4	8
Singapore	180.500	3	209.67	4	231.00	10	5.67	5	3
Hong Kong SAR	150.857	1	306.00	9	218.86	9	6.33	6	7
Norway	271.500	8	206.50	3	237.25	12	7.67	7	4
Belgium	298.667	10	280.44	7	186.56	7	8.00	8	9
Australia	372.319	13	351.69	13	235.97	11	12.33	9	36
Finland	357.944	12	390.89	16	270.11	13	13.67	10	9
Cyprus	479.500	24	431.00	18	100.00	1	14.33	11	1
United States	434.745	21	291.87	8	305.88	15	14.67	12	151
Qatar	245.000	7	463.00	24	271.00	14	15.00	13	1
Germany	414.678	18	322.53	10	342.47	17	15.00	14	45
Canada	389.231	15	347.08	12	362.35	18	15.00	15	26
New Zealand	279.063	9	477.00	27	385.63	19	18.33	16	8
Israel	405.750	17	450.00	22	416.00	23	20.67	17	6
Italy	626.681	47	338.31	11	211.64	8	22.00	18	36
France	483.929	26	437.96	20	390.68	20	22.00	19	28
United Kingdom	443.905	23	440.86	21	411.55	22	22.00	20	84
Macau SAR	548.000	33	497.00	29	180.50	6	22.67	21	2
Portugal	523.357	29	413.29	17	446.86	25	23.67	22	7
Austria	391.125	16	540.88	30	475.63	27	24.33	23	8
China (Mainland)	497.422	27	367.78	15	559.53	31	24.33	24	51
Ireland	424.188	20	479.50	28	459.63	26	24.67	25	8
Georgia	628.000	49	365.00	14	338.00	16	26.33	26	1
South Africa	556.786	35	454.00	23	443.57	24	27.33	27	7
Spain	523.558	30	474.12	26	527.27	29	28.33	28	26
South Korea	439.483	22	586.48	33	543.93	30	28.33	29	29
Brunei	302.750	11	685.50	44	618.00	38	31.00	30	2
Greece	719.833	61	466.83	25	391.17	21	35.67	31	6
Taiwan	419.594	19	699.38	48	632.81	40	35.67	32	16
Saudi Arabia	573.400	37	614.70	35	608.10	36	36.00	33	10
Iran. Islamic Republic of	603.200	40	693.40	46	483.20	28	38.00	34	5
Estonia	622.333	45	636.00	36	603.33	35	38.67	35	3
Belarus	610.250	41	655.50	38	631.50	39	39.33	36	2
Japan	528.598	31	696.22	47	689.88	44	40.67	37	41
Slovenia	765.500	64	563.50	31	595.00	32	42.33	38	2
Lebanon	602.563	39	656.75	39	715.13	49	42.33	39	8

Countries	QS-R		QS-RD		QS-RE		Average	Rank	Number of universities
Oman	375.500	14	800.00	65	757.00	51	43.33	40	1
Bulgaria	628.000	48	685.00	43	636.00	41	44.00	41	1
Turkey	704.944	59	654.56	37	613.33	37	44.33	42	9
India	584.405	38	764.95	63	600.90	33	44.67	43	21
Brazil	653.679	51	591.14	34	775.07	53	46.00	44	14
United Arab Emirates	536.000	32	764.13	61	691.38	46	46.33	45	8
Russia	481.036	25	745.46	58	791.21	56	46.33	46	28
Malta	903.000	77	581.00	32	601.00	34	47.67	47	1
Egypt	696.125	58	434.25	19	837.75	66	47.67	48	4
Chile	668.150	53	721.30	49	689.60	43	48.33	49	10
Czech Republic	621.300	44	743.80	57	709.90	48	49.67	50	10
Pakistan	653.214	50	741.43	55	690.00	45	50.00	51	7
Malaysia	551.200	34	759.55	60	807.70	59	51.00	52	20
Jordan	778.250	65	671.50	40	726.00	50	51.67	53	4
Peru	688.667	55	738.33	53	771.33	52	53.33	54	3
Argentina	616.346	43	743.54	56	826.46	61	53.33	55	13
Hungary	744.000	63	735.75	52	708.88	47	54.00	56	8
Philippines	707.625	60	674.00	41	831.75	62	54.33	57	4
Mexico	673.958	54	687.83	45	837.42	65	54.67	58	12
Poland	800.133	68	751.00	59	689.60	42	56.33	59	15
Ecuador	861.500	71	740.67	54	786.00	55	60.00	60	3
Croatia	903.000	74	684.50	42	868.00	67	61.00	61	2
Thailand	658.375	52	764.25	62	880.88	70	61.33	62	8
Cuba	517.000	28	957.00	79	981.00	78	61.67	63	2
Lithuania	727.125	62	826.75	68	792.25	57	62.33	64	4
Indonesia	565.125	36	860.63	74	977.38	77	62.33	65	8
Slovakia	803.500	69	822.00	67	777.25	54	63.33	66	4
Colombia	625.364	46	856.73	73	907.36	73	64.00	67	11
Costa Rica	794.000	67	783.00	64	836.33	64	65.00	68	3
Kazakhstan	614.800	42	907.20	77	972.70	76	65.00	69	10
Uruguay	690.250	56	846.00	71	877.00	69	65.33	70	4
Latvia	845.000	70	812.00	66	833.67	63	66.33	71	3
Vietnam	903.000	80	721.50	50	905.50	71	67.00	72	2
Ukraine	691.250	57	848.67	72	939.00	75	68.00	73	6
Iraq	903.000	75	729.00	51	987.00	79	68.33	74	2
Romania	903.000	79	829.00	69	799.00	58	68.67	75	2
Kuwait	903.000	76	887.33	76	824.33	60	70.67	76	3
Bahrain	791.000	66	969.50	80	873.00	68	71.33	77	2
Bangladesh	903.000	73	838.50	70	922.50	74	72.33	78	2
Venezuela	871.875	72	887.00	75	906.25	72	73.00	79	4
Panama	903.000	78	931.00	78	997.00	80	78.67	80	1

Source: Our own editing based on SciVal data

Contrary to the expectation that the United States and the United Kingdom would be in the top ten countries in the list, the sequenced ranking showed that the top 10 of the 80 countries included eight Western European countries as well as two Far Eastern city-states, namely Hong Kong and Singapore. The bottom 10 positions are shared by Middle Eastern (3 countries), Eastern European (3 countries), Latin American (2 countries), and South Asian (2 countries) states.

It is also observable that most of the larger, economically developed states reached positions from 11th to 20th such as the United States, the United Kingdom, Germany, France and Italy. Interestingly, the positions of the BRIC states show a much wider variation: China ranks 24th, South Africa 27th, India 43rd, Brazil 44th, and Russia is placed 46th.

Summary

Numerous works in the international literature have already addressed the indicator systems of international university rankings and their relation to each other as well as to the final ranking of institutions. In these works, as described in the introduction, the indicators were basically divided into several pillars. One group included indicators of the university's researcher reputation and citations while the other group included indicators of employer appreciation, the ratio of domestic and foreign students and the number of foreign workers.

The authors found significant relationships between the indicators of the former group, which also shape the final rank for each university. Beyond this, our present study tested how accurately the position of a given institution in the QS ranking can be predicted using only the indicators of research potential and performance.

In our analyses, we determined the alternative rankings for this question with the TOPSIS ranking method, using the basic variables collected from the SciVal database and, in the case of one variable, from the official websites of the universities and the ratios derived from them. Then, the values of these variables were compared with the official QS ranking. We concluded that both rankings were close to the ranking that was obtained by resolving the ties in the QS ranking. The "goodness" of the rankings was determined by Kendall τ-b correlation based on Kemény distance. Our results also show that universities focusing on research excellence are more likely to have a good position in the QS university ranking.

In addition to the QS ranking, further research may focus on whether a similar conclusion can be drawn in the case of the other two major university rankings, THE and ARWU. In essence, the question is whether, and how accurately, the research and publication data obtained from the Scopus and SciVal databases can be used to predict the content of the official rankings.

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