

# Quantitative Comparative Analysis of Country University Competitiveness: The Case of the Near East and South East Asian Countries

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## ABSTRACT

Based on the literature review, a comparative analysis of the university systems of the countries of the Near East and South East Asia was carried out, and the leading countries in these groups were identified. To support the qualitative comparative analysis of these university systems, a quantitative methodology for calculating country university competitiveness has been developed. Since the largest number of universities in all countries of the world is included in the Webometrics Ranking, this methodology is illustrated by its example. It identifies two indicators - the total number of universities in the country and the average positioning of these universities in the selected ranking. After normalizing these indicators, they are aggregated in a multiplicative and additive way to obtain three integral indicators. The features of the discrepancy in the calculations for these integral indicators are explained. This methodology has been proposed to be tried on the example of other world university rankings.

**Keywords:** Quantitative comparative analysis, Country university competitiveness, World University Rankings, Webometrics Ranking, Near East Countries, South East Asia Countries.

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## INTRODUCTION

There is no concept of country university competitiveness in the scientific literature, as can be seen if the term “country university competitiveness” is tested in Google Scholar. The term “regional university competitiveness” was introduced in 2018.<sup>[1]</sup> The methodology for calculating the integral indicators of this competitiveness will be extended in this work to the country level.

Since university competitiveness is directly related to the positioning of universities in world university rankings, we will consider country university systems from these positions. As an example, we will consider all universities in 14 countries of the Near East and 11 countries of South East Asia included in the Webometrics Ranking (July 2020).

## OBJECTIVES AND STUDY SCOPE

The main purpose of the study is to develop methods for quantitative assessment of country university competitiveness and to apply them to the example of Near East and South East

Asia countries. This determined the following research questions:

Qualitative analysis of the university systems in these countries, highlighting the lack of works on country university competitiveness.

Evidence of the lack of the term ‘country university competitiveness’ based on checking the term in Google Scholar.

Development of a quantitative methodology to assess country university competitiveness by aggregating data on the number of universities in the given countries and averaging their position in Webometrics Ranking.

Testing the methodology in 14 countries of the Near East and 11 countries of SouthEast Asia.

Below, the characteristics of the university systems of the countries under consideration are given according to the literature.

## LITERATURE REVIEW

The countries of the Near East consist of a large group of Arab countries, Israel, and Iran with great contradictions among them. Even among the Islamic countries of the Near East, which include Iran along with the Arab countries, there is a great confrontation on religious grounds. Saudi Arabia and

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Iran, the centers of the two main branches of Islam, vie for informal leadership in the Islamic world. All these factors have an impact on the higher education systems in the Near East.

The most competitive university systems there are the university systems of Israel, Iran, and Saudi Arabia, all of which have adopted Western standards for evaluating research results and publication practices with Israel being the first one, followed by Iran, and then Saudi Arabia with the support of the US and other Western European countries.

The most grandiose success in the publication race was shown by Iran, which, in terms of Scopus publication activity, according to the Scimago Journal and Country Rank platform, moved from the 54<sup>th</sup> place in 1996 to the 15<sup>th</sup> place in 2019. According to our cursory Google Scholar search for the term “Iranian Universities”, we see that Iran pays great attention to the development of its many medical science universities, of which it has a large number, as well as library and computer fields, and related university faculties and colleges, much attention is paid to the creation of entrepreneurial universities, since the country lags far behind developed countries in university-industrial cooperation. Since the 60s of the previous century, a lot of attention in the country has been paid to the linguistic training of students on the basis of ESP (English for specific purposes), since it is assumed that they will continue their studies in the West, and then return to their homeland. It is worthwhile mentioning that a very large number of Iranian universities are positioned in world university rankings, having higher ranking than those of the Russian universities.

Israel, as a very small state, cannot compete in the publication race (36<sup>th</sup> place in 2019 in total number of publications in Scimago Journal and Country Rank) with Iran and enter a large number of its universities into the world university rankings. But it has a high-quality higher education system, and it seems to us that it is not very concerned about the flawed university reputation race and the publication race that follows it. Innovative developments of Israeli universities are instantly introduced into practice, and everyone knows very well how high-tech this country is, and how reasonably life is arranged there.

Since university competitiveness is related to university rankings, we only cite one relevant and recently published article, related to Israel university system.<sup>[2]</sup> It evaluates the rating and innovation activity of higher education institutions in Israel. If we look at the latest version of the Webometrics ranking (July 2020), we will see 43 Israeli higher education institutions in it, many of which are probably not accredited as such institutions. If we exclude colleges and centers among them, then we get a list of only ten universities and large institutions of higher education. Of these ten higher education institutions, seven, according to the above work,

were included in 2019 in most of the ARWU, THE, QS, Webometrics, CWTS Leiden and U.S. News Best Global Universities rankings, and have very good positions.

Since the rest of the Near East includes Arab countries and there are relatively many of them (12 countries), we will make a more extensive overview of their higher education systems. The use of benchmarking tools to manage Arab universities has been proposed.<sup>[3]</sup> To do this, the best practice of managing the European TEMPUS and Erasmus projects, in which Arab universities are involved, is analyzed, but without any reference to university rankings. Since the Arab countries of the Maghreb (North Africa) and Mashriq (West Asia) have long been the countries of the Mediterranean partnership with the European Union, it is natural that the practice of interaction between Arab and European universities in the Mediterranean also develops within the framework of this partnership.

In this regard,<sup>[4]</sup> notes the weakness of the local cooperation network and the central role of the USA and European countries in the Middle East cooperation network.

All criteria or indicators for ARWU, QS, THE, and Webometrics ratings has been highlighted.<sup>[5]</sup> Among them, the most important positions are highlighted, which should be guided by Arab universities in order to successfully advance in these ratings. The first five leading universities in the world and all Arab universities are linked to places in these rankings. Further, based on the analysis of the criteria (indicators) of the above four ratings, practical mechanisms (recommendations) for the promotion of universities in them are proposed, using the example of the universities of Kuwait.

In addition to this work, the mechanisms and strategies for promoting Arab universities in the world university rankings are discussed.<sup>[6,7]</sup>

We learn the reasons for the poor representation of Arab universities in the world university rankings,<sup>[8]</sup> which consist of the following points: 1. lack of academic freedom; 2. weak funding for higher education and research; 3. the young age of Arab universities; 4. systemic and cultural reasons associated with the ranking indicators of universities, the main of which relates to the need to present research results in English.

The last point was discussed by Aziz A, *et al.*<sup>[9]</sup> who considers the issued based on the example of Cairo University.

A similar study has been discussed using the example of Saudi Arabian universities, which explains the reasons for some Arab universities to enter the world university rankings and the absence of others in them.<sup>[10]</sup> He explains the latter by the weakness of scientific research and its focus on theoretical and philosophical issues that are far from the applied agenda of socio-economic sciences, including the problems of higher

education management. At the same time, we note that the focus is not just on philosophical issues, but essentially on theological issues.

The ranking of universities may not reflect their real level and position in all areas of knowledge, since world university rankings, along with their advantages, also have significant disadvantages.<sup>[11]</sup> Using the example of universities in Saudi Arabia, the authors show that the best results are achieved by universities that work closely with the world's leading universities. In this regard, we note that according to the UNESCO Institute for Statistics, out of 85,345 Saudi Arabian students studying abroad in 2015, 53,637 students studied in the United States.<sup>[12,13]</sup>

Some Saudi Arabian universities have made unprecedented leaps in world university rankings, thus setting a clear target for universities in the Arab world.<sup>[14]</sup> It is noted that this was achieved thanks to the development of ambitious plans and programs aimed at improving the quality of scientific research and the positioning of Saudi universities in world university rankings.

Furthermore, three criteria of university excellence – the quality of research, the quality of graduates, and the ability of universities to transfer technology and keep it within the Arab world were identified.<sup>[15]</sup>

The monograph *Major Challenges Facing Higher Education in the Arab World: Quality Assurance and Reference*, published in 2019 by Springer, is very important for studying the competitiveness of Arab universities. In terms of positioning Arab universities in world university rankings, the chapter on the university ranking indicator<sup>[16]</sup> is important. It details the methodology of the ARWU, THE and QS rankings, lists the top ten universities in these rankings for 2017–18, as well as all the Arab universities in the tails of these rankings. The new national university ranking developed in Jordan (Jordan University Ranking) is described in detail. It evaluates training with 250 points, research – 250, internationalization – 150, the quality of graduates – 200, academic accreditation – 150 points. Here, the scores seem to correspond to the percentage weights in the top world rankings. Their total value is 1000.

In addition, for the purpose of our study, the previously mentioned work,<sup>[4]</sup> is very important, which on the basis of bibliometric analysis of publications from ISI Web of Science Core Collection (2009 – 2018), shows that, in general, Iran and Saudi Arabia had the best performance in the Middle East countries in the field of engineering. At the same time, the authors from their study did not draw an important conclusion that Israel's weak positioning in this scientific field is linked to the fact that it has long since embarked on a post-industrial path of development, but out of 18 engineering subfields, Israel leads in the two most research intensive subfields: Cell

and Tissue Engineering (first place, RSI = 0.17) and Computer Science, Software Engineering (third place, RSI = 0.16). For the remaining subfields, the values of Relative Specialization Index were negative.

Let's move on to studying the university systems of South East Asian countries, that is, ASEAN countries. A detailed analysis of the university systems of these countries has been done in,<sup>[17]</sup> which contains plans and strategies, as well as goals for the development of higher education in ten ASEAN countries. The issue is raised about the need to develop a coordinated strategy for the development of higher education in these countries, and from 1990 to 2014 data on the Education Index from HDI are presented. Below are the data for the five countries with the best performance of this index for 2014 from this work: Singapore – 0.912; Brunei 0.856; Malaysia 0.779; Thailand – 0.726; Indonesia – 0.684. To date, the ranking of countries for this indicator has hardly changed.

Based on QS TOP University in Asia 2016,<sup>[18]</sup> chose TOP – 70 public universities in ASEAN and for 13 of them, on their websites, calculated their cooperation in percentage with universities of ASEAN, East Asia, Europe, North America and in general with all universities. From these data, it can be seen that such cooperation within the ASEAN countries for the best universities in Malaysia and Singapore did not exceed 31%, at the same time, the National University of Singapore, having such an indicator for the countries under consideration at the level of 7%, cooperated very strongly with the universities of the countries Europe (40.7%) and North America (21.8%). In absolute terms, the University of Malaya had the largest number of cooperation ties in 2016, the number of which was 787.

In our opinion, the issue of the need for closer integration of the university systems of ASEAN countries through the development of a coordinated strategy for the development of higher education is largely related to the weak cooperation of the leading universities of ASEAN countries with other universities in these countries. In this regard, the *Declaration on Strengthening Cooperation on Education and Sharing Community* was adopted at the 15<sup>th</sup> ASEAN Summit in Hua Hin, Thailand.<sup>[17]</sup>

At the same time, as a response to the World Class University or Global University paradigm in ASEAN countries, an issue is raised about Flagship University conception, as evidenced by the title of the work.<sup>[18]</sup>

Within the framework of this concept, corresponding to the Global University model, a lot of attention is paid to Research Output, which has a very strong impact on the positioning of universities in the World University Rankings; we have managed to find relevant work.<sup>[19]</sup> It discusses this issue in detail for universities in Indonesia against the background of leading universities in ASEAN countries and around the

world. It calculated the Research Paper Index (RPI) for 2016–2018 and its growth over the years for all the universities under consideration. It is calculated by dividing the annual number of articles per number of researchers per university. Articles were taken from Scopus and ISOMA (International Society of Ocean, Mechanical and Aerospace), but number of staffs were taken from QS Top Universities Ranking.

RPI has been calculated for 99 leading universities in the world, which includes three universities from Singapore, 31 Universities from ASEAN countries and 34 Indonesian universities. For all three universities in Singapore, 7 from 10 Malaysian universities and one from Indonesian universities, this Index was greater than 1. Thus, from 68 universities in ASEAN countries, only 10 universities had an RPI > 1. To get an idea of the maximum values of this index, we give its highest values from the article in question for 2018: California Institute of Technology – 7.789; Korea University – 4.995; Aalto University (Finland) – 4.981; Tokyo Institute of Technology – 4.678; Ecole Normale Supérieure (Paris) – 4.242.<sup>[19]</sup>

In the conclusion of the literature review on the university systems of ASEAN or South East countries, we present very important data on the university potential of these countries with an assessment of the quality of this potential carried out by the British Council.<sup>[20]</sup> The university potential of these countries at the level of 2016 is given according to SEAMEO – RIHED (2016). According to these data, the number of Higher Education Institutions (7,788 institutions) are distributed in these countries as follows: Indonesia – 4,400; Philippines 2,299; Vietnam – 419 (2014); Cambodia – 211; Myanmar – 163; Thailand – 155; Malaysia – 111; Laos – 14 (2015); Singapore – 11; Brunei – 5. Note that on the 23–25<sup>th</sup> of February 2016 (Bangkok, Thailand) under the auspices of SEAMEO-RIHED, the International Workshop on Internationalization and Academic Exchanges was held, where these data were announced. The above abbreviation refers to the Regional Center for Higher Education and Development of Southeast Asian Ministers Education Organization.

British Council research on International Higher Education (2018) posted the following Overall Score for National Policies Framework ASEAN countries: Malaysia – very high; Brunei, Indonesia, Philippines, Singapore, Thailand, Vietnam – high; Cambodia, Laos, Myanmar – low.<sup>[20]</sup>

Two reviews of work on the development of university systems in Near East and South East Asia countries clearly show that the latter countries have worked out strategies and policies for Higher Education development at the governmental and intergovernmental levels, which cannot be said about the former countries. Moreover, in both groups of countries, the weakness of the regional university cooperation is noted.

So the literature review showed that there is currently no work on the quantitative assessment of the aggregated positioning of universities in world university rankings at the country level, which characterizes the country university competitiveness. In this regard, the purpose of this research is to develop a quantitative methodology of country university competitiveness, which will be illustrated by the example of Near East and South East Asia countries.

## METHODOLOGY

It is well known that the competitiveness of universities is determined by their world university rankings, so if we want to determine Country University Competitiveness, we have to aggregate all the universities in the country that have world university rankings and build some integral indicator based on this. Note that the term “Country University Competitiveness” is absent in the scientific literature, as shown by our experiments in the advanced search Google Scholar. Such an integral indicator can be constructed in various ways.

A transparent approach to determining the integral indicator of Country University Competitiveness, taking into account not only the number of universities included in a particular rating, but also their average positioning in this rating has been developed. This approach at the regional Russian level was tested when considering two national ratings and the Webometrics rating.<sup>[1]</sup> Let's consider it below at the country level.

We will rely on the Webometrics ranking, which takes into account almost all universities in the countries of the world. We will normalize the number of universities according to this ranking for each country to the maximum value for the entire sample of universities:  $\frac{N_i}{\max\{N_i\}}$ ,  $N_i$  – number of universities in  $i$  – th country.

For each country, we will calculate the average positioning of universities according to the rating under consideration. It is defined as the arithmetic mean of all university ranks in the Webometrics ranking, which we will also normalise to the maximum value in the sample of countries. Since the rank of a university in the ranking when constructing an integral indicator is a de-stimulator, that is, with an increase in the rank, the rating of a university or its Overall Score decreases; we will use a mathematical complex  $1 - \frac{\bar{R}_i}{\max\{\bar{R}_i\}}$ , where  $\bar{R}_i$  – averaged rank for all universities of the  $i$  – th country, determined according to the following formula.

$$\bar{R}_i = \frac{\sum_{j=1}^{N_i} R_{ij}}{N_i} \quad (1)$$

where  $R_{ij}$  – rank of  $j$  – th university in the Webometrics ranking for  $i$  – th country.

With the two maths complexes  $\frac{N_i}{\max\{N_i\}} - 1 - \frac{\bar{R}_i}{\max\{\bar{R}_i\}}$ , let's generate an integral indicator on their basis in three possible ways:

$$I_{1i} = \frac{N_i}{\max\{N_i\}} \left( 1 - \frac{\bar{R}_i}{\max\{\bar{R}_i\}} \right) \quad (2)$$

$$I_{2i} = \sqrt{\frac{N_i}{\max\{N_i\}} \left( 1 - \frac{\bar{R}_i}{\max\{\bar{R}_i\}} \right)} \quad (3)$$

$$I_{3i} = \frac{N_i}{\max\{N_i\}} + \left( 1 - \frac{\bar{R}_i}{\max\{\bar{R}_i\}} \right) \quad (4)$$

The first two integral indicators are constructed in a multiplicative way, the second one according to the principle of the geometric mean, and the third is constructed in an additive way. Note that the first two indicators will change within the range from 0 to 1, and the third – within the range from 0 to 2, without reaching 2, since the minimum value of  $R_i$  is 1, not 0. In the first case, we can introduce a five-level uniform scale with the same 0.2 step with very high, high, medium, low and very low levels of country university competitiveness. In the second case, it is unlikely that the upper limit of the range of changes in the integral indicator  $I_{3i}$  is close to 2. This can be shown by the example of US universities, which a priori have the best value of this indicator. For the US Webometric ranking for July 2020, we have  $N_i = 3.254$ ,  $R_i = 7.437$ , hence, bearing in mind that  $\max\{N_i\} = 3.254$ ,  $\max\{R_i\} = 27.032$  (Kiribati, two universities with ranks 25.582 and 28.482), we get  $I_{3i} = 1.72$  by formula (4). In general, situations where  $I_{3i} > 1$  will be rare. Then it will be possible to introduce a classification scale with a constant increment of 0.25 to 1, and take the fifth gradation as  $I_{3i} > 1$ .

The methodology offered will be tried with the examples for 14 Near East and 11 South East Asia Countries.

When our article was already written, we found that Kalthor and Mehrparvar (2020) proposed an alternative methodology for calculating the integral indicator of country university competitiveness, which they determined using the formula:

$$W_i = \sum_{i=1}^n (M - R_i + 1) \quad (5)$$

where the  $W$  is the weight of the country,  $n$  is the total number of universities number of each country,  $M$  is the total number of universities number in the world's list and  $R_i$ , just like in

our case, is the ranking of each university in the Webometrics Ranking.<sup>[21]</sup>

In our study, the maximum Webometrics Rank was 30585 for the worst university of Indonesia. Therefore, the value of 30585 is taken as the maximum indicator ( $M$ ) for determining  $W_i$  for each country groups.

## RESULTS

Calculations using formulas (2 – 5) for both country groups are shown in Tables 1 and 2. They show the maximum, minimum and average values of the ranks of the webometric ranking of universities, as well as additionally calculated the specific indicator of the number of universities per 1 million inhabitants.

As Table 1 suggests, Iran, Saudi Arabia, Israel, the United Arab Emirates, and Iraq are the leading countries in terms of the values of the multiplicative indicators (formulas 2 and 3), in terms of the values of the additive indicator (formula 4) – the leading countries are Iran, Israel, Saudi Arabia, Jordan, and Qatar, and for  $W$  – Iran, Iraq, and Saudi Arabia. In terms of the number of universities per million inhabitants, Palestine, Bahrain, Iran, Lebanon and Oman are the leaders (approximately 8 to 10 universities per million inhabitants).

Table 2 suggests that Indonesia, Thailand, Malaysia, the Philippines and Vietnam are leading in terms of the multiplicative indicators (formulas 2 and 3), Indonesia, Laos, Singapore, Thailand and Vietnam are leading in terms of the additive indicator (formula 4), and according to indicator  $W$  the leaders are Indonesia, Malaysia and the Philippines. Brunei, Malaysia and Indonesia are in the lead in terms of the number of universities per million inhabitants by a wide margin (from 10 to 15 universities per million inhabitants).

From these calculations we see that for very large values of  $\max R_i$ , calculations using the additive formula 4 give strongly overestimated results for countries with a small number of universities and with a relatively high average rank. An example of Laos that according to the indicator in question received the same values as Singapore and Thailand shows that it is not real.

The distribution of the countries under consideration by the gradations of university competitiveness proposed in the *Materials and Methods* section are shown in Table 3. It shows that with the account of some difference in the gradations of the two scales, the second scale for the integral indicator  $I_{3i}$  shifts the countries under consideration to gradations with a higher degree competitiveness and differentiates them to a greater extent.

The cross-correlation matrices calculated from the data in Tables 1 and 2 are shown in Tables 4 and 5. Pearson's paired

**Table 1: Calculation of integral indicators of university competitiveness of Near East Countries based on the Webometrics ranking, July 2020.**

No	Country	Number of universities (N)	max Rank	min Rank	average Rank	$I_{1i}$	$I_{2i}$	$I_{3i}$	$W_i$	Number of universities per 1 million inhabitants ( $N_i^{ave}$ )
1	Bahrain	13	27,078	2,389	13,085	0.01	0.09	0.43	227,511	8.638
2	Jordan	36	23,257	1,009	9,036	0.03	0.17	0.65	775,791	3.327
3	Israel	43	20,863	123	7,333	0.04	0.20	0.73	999,872	4.957
4	Iraq	113	30,509	2,136	17,269	0.04	0.19	0.38	1,504,806	2.907
5	Iran	730	30,523	418	16,573	0.26	0.51	1.26	10,229,282	8.596
6	Yemen	47	30,563	4341	22,366	0.00	0.00	0.06	386,351	1.573
7	Qatar	13	25,180	858	10,918	0.01	0.10	0.53	255,686	5.319
8	Kuwait	12	22,874	3,249	11,254	0.01	0.09	0.51	231,985	4.008
9	Lebanon	46	30,056	724	15,341	0.02	0.14	0.38	701,279	8.410
10	UAE	70	30,120	1,091	13,998	0.04	0.19	0.47	1,161,146	7.006
11	Oman	39	23,392	1,257	14,738	0.02	0.13	0.39	618,053	8.360
12	Palestine	28	27,157	1,537	12,859	0.02	0.13	0.46	496,357	9.655
13	Syria	37	29,394	3,578	18,097	0.01	0.10	0.24	462,085	1.907
14	Saud.Arabia	70	28,009	409	9,928	0.05	0.23	0.65	1,446,065	2.048

**Table 2: Calculation of the integral indicators of university competitiveness of South East Asia Countries based on the Webometrics ranking, July 2020.**

No	Country	Number of universities (N)	max Rank	min Rank	average Rank	$I_{1i}$	$I_{2i}$	$I_{3i}$	$W_i$	Number of universities per 1 million inhabitants ( $N_i^{ave}$ )
1	Brunei	7	22,445	2,624	13,084	0.00	0.04	0.51	122,514	15.071
2	East Timor	8	30,538	14,809	25,582	0.00	0.01	0.03	40,033	5.782
3	Vietnam	176	30,010	1,043	13,022	0.03	0.18	0.57	3,091,350	1.783
4	Indonesia	2,694	30,585	694	22,717	0.14	0.37	1.14	21,197,889	10.089
5	Cambodia	52	29,931	5,208	20,010	0.00	0.07	0.26	549,960	3.072
6	Laos	3	16,718	4,833	10,253	0.00	0.03	0.61	61,000	0.403
7	Malaysia	381	30,449	375	19,783	0.04	0.19	0.39	4,116,107	11.668
8	Myanmar/ Burma	83	30,560	7116	26,315	0.00	0.00	0.03	354,508	1.467
9	Singapore	45	24,156	51	10,823	0.01	0.10	0.61	889,342	7.247
10	Thailand	189	29,498	530	12,230	0.04	0.19	0.61	3,469,338	2.740
11	Philippines	297	29,374	1,246	18,158	0.03	0.18	0.42	3,690,984	2.720

correlation coefficients turned out to be quite high, excluding the correlation coefficients with the number of universities per million inhabitants. The  $W$  indicator showed the best values of the correlation coefficient with other indicators. All this suggests that in the considered groupings of countries, all the proposed integral indicators can be used to calculate the country university competitiveness, but in the final expert assessment of such competitiveness, it is necessary to carry out calculations for other World University Rankings.

## DISCUSSION

The proposed integral indicators (2–4) together with the integral indicator (5)<sup>[21]</sup> demonstrated a strong correlation (Tables 4 and 5), with a slightly worse correlation between the additive integral indicator (4) and the other indicators. Comparing the cross correlation matrices in the aforesaid two tables, we see that the values of Pearson correlation factors in the second matrix (South East Asia Countries) are 5–10 % lower than those in the first matrix.

**Table 3: Distribution of Near East and South East Asia Countries by country university competitiveness gradations.**

Competitiveness Degree	Indicator $I_{2i}$			Indicator $I_{3i}$		
	Gradation	Near East countries	South East Asia countries	Gradation	Near East countries	South East Asia countries
Very low	$0 \leq I_{2i} < 0.2$	Bahrain, Jordan, Iraq, Yemen, Qatar, Kuwait, Lebanon, UAE, Oman, Palestine, Syria	Brunei, Timor Leste, Vietnam, Cambodia, Laos, Malaysia, Myanmar / Burma, Singapore, Thailand, Philippines	$0 \leq I_{3i} < 0.25$	Yemen, Syria	East Timor, Myanmar / Burma
Low	$0.2 \leq I_{2i} < 0.4$	Israel, Saudi Arabia	Indonesia	$0.25 \leq I_{3i} < 0.5$	Bahrain, Iraq, Lebanon, UAE, Oman, Palestine	Cambodia, Malaysia, Philippines
Medium	$0.4 \leq I_{2i} < 0.6$	Iran		$0.5 \leq I_{3i} < 0.75$	Jordan, Israel, Qatar, Kuwait, Saudi Arabia	Brunei, Vietnam, Laos, Singapore, Thailand
High	$0.6 \leq I_{2i} < 0.8$			$0.75 \leq I_{3i} < 1.0$		
Very high	$0.8 \leq I_{2i} < 1.0$			$I_{3i} \geq 1.0$	Iran	Indonesia

**Table 4: Cross-correlation matrix for the values of  $N_i, I_{1i}, I_{2i}, I_{3i}, W_i, N_i^{ave}$  Near East Countries.**

	$N_i$	$I_{1i}$	$I_{2i}$	$I_{3i}$	$W_i$	$N_i^{ave}$
$N_i$	1					
$I_{1i}$	0.98424	1				
$I_{2i}$	0.89132	0.94949	1			
$I_{3i}$	0.77032	0.85790	0.90662	1		
$W_i$	0.99733	0.99452	0.91876	0.80943	1	
$N_i^{ave}$	0.25986	0.26714	0.27993	0.31265	0.26386	1

**Table 5: Cross-correlation matrix for the values of  $N_i, I_{1i}, I_{2i}, I_{3i}, W_i, N_i^{ave}$  South East Asia Countries.**

	$N_i$	$I_{1i}$	$I_{2i}$	$I_{3i}$	$W_i$	$N_i^{ave}$
$N_i$	1					
$I_{1i}$	0.96028	1				
$I_{2i}$	0.81113	0.93747	1			
$I_{3i}$	0.72324	0.77718	0.77203	1		
$W_i$	0.99165	0.98824	0.87762	0.75540	1	
$N_i^{ave}$	0.31365	0.25913	0.21527	0.26778	0.29160	1

A good correlation between the simplest aggregate indicator in the form of the number of universities in the country ( $N_i$ ) and all other integral indicators is of particular interest; in the simplest case, it allows to estimate the country university competitiveness without performing relatively complex calculations, using formulas (2–5). But this conclusion needs quantitative confirmation on other larger samples of countries, and using other World University Rankings.

For the further development of this methodology, a specially constructed Aggregated World University Ranking is proposed that includes all significant World University Rankings, which will allow in some way to level the variety of existing methodologies for their calculations. An example of such a ranking is the Aggregated Global University Ranking (AGUR).<sup>[22]</sup>

### CONCLUSION

Thus, based on the literature review, a qualitative analysis of the state of university systems in the countries of the Near East and South East Asia was carried out, as a result of which countries with the most competitive university systems were identified. Moreover, their competitiveness is determined by their global universities included in the world university rankings. For a quantitative assessment of the country university competitiveness, a special methodology has been developed, which allows, knowing the number of universities in the country and their average positioning in one of the world university rankings, to determine, in an additive or multiplicative way, the integral indicators of the country university competitiveness. To these integral indicators an alternative integral indicator was added that was recently obtained by Iranian scientists. Cross-correlation analysis of all the proposed integral indicators showed consistent results. The calculations confirmed our qualitative analysis of the competitiveness of university systems of the countries under consideration, obtained on the basis of a literature review, giving it a quantitative character.

But in order to draw final conclusions on the country university competitiveness of the considered groupings of countries, as well as any other groupings, it is necessary to carry out similar calculations for other world university rankings. Ideally, a good idea would be to carry out calculations for

the aggregated university ranking that includes all the key world university rankings and levels out the diversity of their methodologies, while the increase in the country university competitiveness at the level of countries, as well as their groupings, would require development of appropriate strategies, policies, and plans, such as is the case with ASEAN countries.

## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

## REFERENCES

- Moskovkin VM, Yawei L. On the evaluation of the regional university competitiveness. *Economic Research*. 2018;4(1):35-53. (in Russian). doi: 10.18413/2409-1634-2017-4-1-35-53.
- Lapushin R, Israeli M. Assessing the rating of innovative activities of higher educational institutions: On the example of Israel. *Journal of Research on Trade, Management and Economic Development*. 2020;1(13):59-70.
- El Hassan K, Abu-Orabi S, Al-Zoubi A. Benchmarking tools for good governance in Arab universities. *Journal of Association of Arab Universities for Higher Education Research*. 2018;38(2):1-24.
- Fazeli, Varzaneh M, Ghaderi, Azad E, Elango B. Middle East countries' contribution to global engineering research: A bibliometric analysis. *International Journal of Information Science and Management*. 2021;19(1):1-13.
- Alsharif F. Kuwait University ranking in the light of the international universities ranking standards: an analytical evaluation study. *Journal of Educational Studies*. 2020;32(3):627-48.
- Hassan MA. Curricula and indicators of Competitiveness of Arab universities. *Conference on the Competitiveness of Universities and Institutions of Higher Educations and Scientific Research in Egypt and Arab Countries under the International Trade in Services Agreements*. 2006;4-113. (in Arabic).
- Al Sharbini GH. To explore the future of Arab universities in the content of international classifications. 6<sup>th</sup> Arab International Conference for Quality Assurance of Higher Education. Sudan. Khartoum: University of Science and Technology; February 9-11, 2016. (in Arabic).
- Saqr A. Arab universities facing global classifications. *Future Horizons Magazine*. Abu Dhabi: Emirates Center for Strategic Studies and Research. 2011;59-63. (in Arabic).
- Aziz A, Sidqi KB. Effect of international publications on the ranking of universities in international classifications: Cairo University as a model. *Cybrarians Journal*. 2015;37 (in Arabic).
- Sa'egh AA. International classifications of universities experience of Saudi universities. *Saudi Journal of Higher Education*. 2011;5:25-38. (in Arabic).
- Bodyaf AM, Brahmia A, Hamouda N. To explore the future of Arab universities in the light of international classifications. 6<sup>th</sup> Arab International Conference for Quality Assurance of Higher Education. Sudan. Khartoum: University of Science and Technology; February 9-11, 2016 (in Arabic).
- UNESCO, U. Institute for statistics. UIS. Stat. [accessed Nov 22, 2018], Available from: <http://data.uis.unesco.org/>.
- Jafar H, Knight J. Higher Education in the Arab States: The Realities and Challenges of Regionalization. *cie-eci*. 2020;48(2):1-19. doi: 10.5206/cie-eci.v48i2.10788.
- Al Seddiki S. Arab universities and the challenge of global classification: the way to excellence. *Journal of Strategic Perspectives*. Abu Dhabi: Emirates Center for Strategic Studies and Research, April. 2014:8-47. (in Arabic).
- Hamdan AM. The path to world-class research universities: A comprehensive study of Arab universities. *Omran For Social Sciences*. 2015;4(13):65-104.
- Badran A, Badran S. Indicators of institutional and program ranking of universities with reference to the Arab world. Berlin: Springer. p. 179-210. doi: 10.1007/978-3-030-03774-1\_9; 2019;179-210. Inmajor Challenges Facing Higher Education in the Arab World: Quality Assurance and Relevance. Available from: [https://en.unesco.org/sites/default/files/book1\\_01.pdf](https://en.unesco.org/sites/default/files/book1_01.pdf) [cited 3/11/2022].
- Tamuri AH, Othman NB. Challenges and solutions of higher education institutions in Asia in the face of the ASEAN economic community (AEC). *Proceeding the First International Conference on Law, Economics and Education*. Indonesia: Muhammadiyah of Metro. 2016;8-13.
- Sirat M. ASEAN's flagship universities and regional integration universities. *Higher Education and Development*. 2017;11(2):68-80.
- Koto J, Syukri M, Arief DS. Research output in Indonesia comparing to other countries in ASEAN and the world. *Proceeding of ocean, mechanical and aerospace-science and Engineering*. 2018;5(1):47-56.
- Prasetyawati YR, Alverina C. Higher education within ASEAN connectivity. *Asia Pacific Study*. 2018;2(1):46-58.
- Kalhor B. Rankings of countries based on rankings of universities. April 20, 2020. Available from: SSRN. doi: 10.2139/ssrn.3585226.
- Moskovkin VM, Golikov NA, Peresyypkin AP, Serkina OV. Aggregate Ranking of the World's leading universities. *Webology*. 2015;12(1):Article 133.