

Assessment of the universities impact on global competitiveness based on rankings

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Abstract. The paper analyzes the ranking positions of universities in leading countries in comparison with the most popular ratings of overall country and digital competitiveness. This analysis is carried out in order to understand whether there is a relationship between the aggregate high rating of universities with the same position of general and digital competitiveness. Conclusions based on the results of the analysis are important for studying the impact of universities on the development of territories, the pace of structural transformation of the analog economy into a digital one, and ensuring the transfer of knowledge. In addition, the comparison of the methods of rating formation allows us to understand its applicability for making strategic government management decisions.

1 Introduction

The issues of assessing the competitiveness of countries and regions in the world economy have been studied for a long time and at different levels. In 1968, under the leadership of Irving Kravis, a small research project began at the University of Pennsylvania under the patronage of the United Nations Statistical Commission, which grew into an International Comparison Program in 2005 [1]. The concept and structure of cross-country comparisons have evolved over the past 50 years, the methodology and evaluation methods have been constantly improved, and the number of countries compared has increased from 10 to 176 [2; 3].

Today, we can talk about the formation of 35 global ratings for nine groups that assess the level of countries development, including economic, social, demographic, institutional, communication, and global indicators [4].

Most modern researchers of national and global competitiveness note a significant influence of endogenous factors of the variable (investment in human capital, knowledge, skills development, formation of innovative and research skills), excluding the influence of primary factors (natural and financial resources, cheap labor, a stable financial system). This is what is said in the research of the first decade of the twentieth century [5; 6; 7].

A study of European scientists based on data from 144 countries proves the essential relationship between the pace of countries development and its place in the Global

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Competitiveness Index [8].

Attempts are made to investigate the relationship between the level of knowledge in a country and its global competitiveness. In the study [9], scientists evaluated the dependence of the Global Competitiveness Index (GCI) on factors such as the size of investment in research, innovation activity, the share of the population with higher education and continuing education, GDP per capita and the cost of capital on the example of 34 countries, including 27 countries of the European Union. According to the results of the study, innovation and education have the greatest influence on the value of the global competition index.

Continuing the research of van Raan, L. Harvey, J. C. Shin, and et al. [10, 11, 12], who proved the existence of a relationship between the university's rating and its age, size, disciplinary differences, and English language skills, G. A. Olcay, M. Bulu [13], comparing the data of the world rankings of the Times Higher Education World Rankings (basic research ranking), ARWU (Shanghai Ranking), QS World University Rankings, CWTS Leiden for 2015 according to the ranking criteria, the indicators taken into account, the information base, the main provisions of the rating methodology, revealed significant differences between the indices even when measuring the same criterion, including "training", "research", as well as the increase in index variability as the objects of observation increase (for example, top 50 or top 100 universities). In the work of 2020, Spanish researchers [14] proved the dependence of the level of competitiveness of the European territory on both high public or private spending on R&D, and on the presence of at least one university in the top 300 in the same country.

To reduce the ambiguity of composite indices, to smooth out minor rating differences between universities, the European researcher Jill Johnes [15] suggests making a rating for groups of universities, which will preserve the unique specialization of the university, without compromising the rating.

Taking into account the significant role of education in the development of society and the economy, measurement and evaluation of the activities of universities are significant factors for understanding the global competitiveness of the country. This study aims to identify the relationship between the competitiveness of the country and the place of its universities in the world rankings. Understanding that in the modern theory and practice of ranking countries by groups of indicators, ratings depend on subjective, possibly biased significance in the construction of a composite indicator, we admit the possibility of a distorted result of measuring and evaluating the impact of the university's leadership positions on the country ratings of global general and digital competitiveness.

2 Materials and Methods

The study used two of the most authoritative university rankings: the Times Higher Education World University Rankings of 2021 [16] and the overall QS World University Rankings of 2021 [17]. For each rating, the first 200 places with accurate evaluation scores were taken, since after 200 places, the scores in points are presented in interval boundaries and are significantly reduced in comparison with the leading group of universities. The 200 places, including the universities with the same number of points, were grouped by country, which allowed us to determine the overall rating of the leading universities for each country that has such universities. A comparison of the structural characteristics of each country's contribution to the total amount of points in the two ratings allows us to draw conclusions about the similarities or differences between these two ratings, which permits us to determine the country's contribution to the global scientific and educational capital. The subject of the paper is not the well-known criticism of ranking, nor is it the criticism of the clear leadership of English-speaking universities. We understand the selection of criteria

and factors for rating within the Anglo-Saxon legal family and take these aspects into account when analyzing the data. We did not consider it necessary to use rankings that were originally methodologically focused on assessing the level of lag between national universities and world-class universities, for example, the Academic Ranking of World Universities (Shanghai Ranking) [18].

To analyze the impact of universities on the level of country competitiveness, The IMD World Competitiveness Ranking 2020 was used [19]. This rating was chosen as the main one for 2020, because it takes into account a fairly wide range of indicators by factors: economic indicators, government efficiency, business efficiency, infrastructure. Comparability of the period with university rankings is acceptable, since the 2021 rankings are actually based on 2020 data. Unfortunately, for 2020, we were not able to use the Global Competitiveness Index [20], determined by the World Economic Forum, which, in our opinion, provides the widest possible set of competitiveness indicators for various countries of the world. The overall rating of global competitiveness in 2020 was not determined. In addition, we used The IMD World Digital Competitiveness Ranking 2020 [21], since the activities of universities are aimed at the development of digital competencies and technologies, among the rating factors: knowledge (abilities, training and education, scientific concentration), technology (regulatory framework, capital, technological base), readiness for the future (adaptation, business flexibility, IT integration).

3 Rating analysis

Tables 1 and 2 show the total score of universities based on the two rankings under consideration – Times Higher Education World University Rankings 2021 and QS World University Rankings 2021.

Table 1. Total score of universities based on the Times Higher Education World University Rankings 2021.

Jurisdiction	Total points	% to total
1 United States	4200.2	31.54
2 United Kingdom	1,832.4	13.76
3 Germany	1,359. 4	10.21
4 Australia	823	6.18
5 Netherlands	700.9	5.26
6 China	543	4.07
7 Canada	482.9	3.62
8 Switzerland	464	3.48
9 South Korea	418.3	3.14
10 Hong Kong	334.2	2.51
11 France	314.5	2.36
12 Sweden	308.6	2.31
13 Belgium	247.8	1.86
14 Denmark	180.1	1.35
15 Italy	167.9	1.26
16 Spain	167.3	1.25
17 Singapore	156.2	1.17
18 Japan	146.3	1.09
19 Taiwan	62.3	0.46
20 Finland	62.1	0.46
21 Norway	59.4	0.44
22 New Zealand	57.8	0.43

Table 1. Continued.

23 South Africa	57.3	0.43
24 Ireland	57.3	0.43
25 RF (MSU)	55.9	0.41
26 Israel	54.7	0.41
Total	13,313.8	100

Table 2. The total score of universities based on the QS World University Rankings 2021.

<i>Jurisdiction</i>	<i>Total points</i>	<i>% to total</i>
1 USA	3,076.9	24.94
2 United Kingdom	1,725.5	13.99
3 Australia	668	5.41
4 Germany	654.7	5.30
5 Japan	613.1	4.97
6 China	513.4	4.16
7 Netherlands	496.1	4.02
8 South Korea	464.6	3.76
9 Switzerland	460.2	3.73
10 Canada	444.1	3.60
11 Hong Kong	381.7	3.09
12 France	306.9	2.48
13 Sweden	271.1	2.19
14 Malaysia	270.9	2.19
15Singapore	181.4	1.47
16 Denmark	174.4	1.41
17 Belgium	159.6	1.29
18 Italy	147	1.19
19 India	114.8	0.93
20 Taiwan	113.9	0.92
21 Finland	111.2	0.90
22 New Zealand	109.3	0.88
23 Mexico	108.7	0.88
24 Ireland	104.1	0.84
25 Chile	99.4	0.80
26 Norway	98.6	0.79
278 Austria	94.3	0.76
28 Spain	88.2	0.71
29 Argentina	67.5	0.54
30 RF (MSU)	65.9	0.53
31 Brazil	54.8	0.44
32 Kazakhstan	46.9	0.38
33 Israel	45.7	0.37
Total	12,332.9	100

The data in Tables 1 and 2 show that the leadership of universities in four jurisdictions remains unchanged: the United States, Great Britain, Australia and Germany. China and the Netherlands have roughly the same rating positions. In general, it can be noted that both rankings give the same understanding of the leadership positions of universities. A significant difference is observed mainly only in Japan, in the QS World University Rankings 2021, many more Japanese universities occupy high positions. The methodology of the QS World University Rankings 2021 rating allows more universities from different jurisdictions to take high ranking positions, so the list of jurisdictions in the second table was larger.

The IMD World Competitiveness Ranking has some changes in the composition of the leading jurisdictions compared to the 2019 rating, some of the changes are due to the impact of the different epidemiological situation of the COVID-19 pandemic on the effectiveness of public administration and the functioning of business in such conditions

(Table 3) . Of the top 10 countries, the most notable changes in the rating occurred for the United States – the loss of 7 positions, a decrease from the 3^d to the 10th place, an increase in the rating of Denmark from the 8th places to the 2^d, an increase in the rating of Norway by 4 positions and Canada by 5 positions. In addition, of the 63 ranked countries, the most significant changes occurred: Cyprus improved its position by 11 places, Estonia improved its position by 7 places, and China worsened its position by 6 places. The correlation between the analyzed university rankings and the IMD World Competitiveness Ranking is weak. Of course, it is possible to assume the impact of the pandemic factor in 2020, in which conditions for such a short period there could be no changes in the influence of universities on the factors taken into account when compiling the IMD World Competitiveness Ranking, but a weak correlation is also found when comparing the ratings for 2019 without the impact of the pandemic. A weak correlation of university rankings is also observed with the pre-pandemic Global Competitiveness Index 2019. In general, it can be said that the pandemic factor did not affect the coherence of the university ratings under consideration and the ratings of overall competitiveness.

Table 3. Comparison of ratings.

Jurisdiction	Times Higher Education World University Rankings 2021	QS World University Rankings 2021	IMD World Competitiveness Ranking		The IMD World Digital Competitiveness Ranking		Global Competitiveness Index 2019
			2019	2020	2019	2020	
1 United States	1	1	3	10	1	1	2
2 United Kingdom	2	2	23	19	15	13	9
3 Germany	3	4	17	17	17	18	7
4 Australia	4	3	19	16	20	17	16
5 Netherlands	5	7	6	4	6	7	4
6 China	6	6	14	20	22	16	28
7 Canada	7	10	13	8	11	12	14
8 Switzerland	8	9	4	3	5	6	5
9 South Korea	9	8	28	23	10	8	13
10 Hong Kong	10	11	2	5	8	5	3
11 France	11	12	31	32	24	24	15
12 Sweden	12	13	9	6	3	4	8
13 Belgium	13	17	27	25	25	25	22
14 Denmark	14	16	8	2	4	3	10
15 Italy	15	18	44	44	41	42	30
16 Spain	16	28	36	36	28	33	23
17 Singapore	17	15	1	1	2	2	1
18 Japan	18	5	30	34	23	27	6
19 Taiwan	19	20	16	11	13	11	12
20 Finland	20	21	15	13	7	10	11
21 Norway	21	26	11	7	9	9	17
22 New Zealand	22	22	21	22	18	22	19
23 Ireland	23	24	20	21	27	23	24
24 RF (MSU)	24	30	45	50	38	43	43
25 Israel	25	33	24	26	16	19	20

Our initial hypothesis that The IMD World Digital Competitiveness Ranking should be more closely linked to university rankings has not been confirmed. The IMD World Competitiveness Ranking and The IMD World Digital Competitiveness Ranking show significant similarity, as some of the indicators are interrelated, but the difference between it isn't noticeable when compared with the university rankings under consideration.

4 Conclusions

In general, the combined leadership positions of the world's universities are slightly related to the ratings of global general and digital competitiveness. At the same time, modern universities should be centers of innovation growth, concentration of knowledge capital, and territorial development. Further research on the quality and applicability of university rankings and country competitiveness rankings should follow from this conclusion, as the possible reasons are as follows:

1) the considered university rankings do not take into account the influence of universities on the development of territories through the concentration of knowledge capital;

2) leading universities have an impact only on the global accumulation of knowledge, which is “dissolved” in national jurisdictions and such an influence is in principle impossible to determine;

3) the methodology of the global competitiveness rankings does not take into account the factors of the knowledge economy formation, is slightly focused on the accumulation of scientific and educational potential, which cannot be considered to be justified in the context of the transformation of the analog economy into a digital one;

4) high positions in the global rankings of general competitiveness with low university ratings may indicate an effective export of knowledge capital, high recipient qualities of knowledge transfer;

5) university rankings depend on subjective, possibly biased significance when constructing a composite indicator. For this reason, we admit the possibility of distorting the result of measuring and evaluating the impact of the university's leadership positions on the country ratings of global general and digital competitiveness.

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