Impact of International Ranking and Accreditation on the Performance of Lebanese HEIs and the new U-Multirank Approach

A Lebanese HEREs short study

Diane Nauffal

Hania Nakkash

Chafic Mokbel

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Introduction

Ranking of higher education institutions (HEIs), universities and schools has been practiced a long time ago in different systems. In the eighteenth century, France created the "*Grandes Ecoles*". Around 1900, university rankings started in England with the publication of "*Where We Get Our Best Men*". In 1983, *US News and World Report* published "*America's Best Colleges*". However, the ranking of universities in its modern sense started in 2003 with the release of the *Academic Ranking of World Universities* (ARWU) by *Shanghai Jiao Tong University* in China. The rankings have become today a driving factor in decision making and allocation of resources.

Higher education has different facets and operating institutions and universities have their own properties on each of those facets. Ranking differs from the traditional quality assurance process. The later is a review by peers that studies each institution taking into consideration its operating context, and aims at assuring both accountability and continuous improvement. In comparison, ranking aims generally at projecting a set of institutions on a scale. This projection is not necessarily conducted by peers but usually by an independent institution. Measurements taken from a set of institutions along different dimensions defined by the indicators are mixed up in order to produce a ranking number allowing the ordering of the observed institutions. While criticized, the simplification of the multifaceted nature of higher education as done by rankings did not stop their development at global and regional levels. The claim in [1] 'love them or hate them, rankings are here to stay' showed to be right. Rankings are politically influential due to the increasing interests of socio-politico-economic actors seeking to highlight the prestige of educational institutions which attracts brilliant students, word class researchers and funding.

The present study is prepared as a background document to the workshop organised by Erasmus+ HEREs on rankings. It presents valuable information and references to existing ranking systems and some studies.

The next section provides an analytical presentation of four ranking systems and the corresponding criteria and indicators. Afterwards, the merits and demerits of ranking is discussed. The position of Lebanese universities in rankings is then presented. The document ends with some conclusions.

Rankings and Indicators

Generally, a ranking system defines publically a set of indicators. It also specifies the data sources providing the needed information for the defined indicators. A methodology is also applied in order to combine the different measurements yielding a value on a scale that allows ordering the different institutions under scrutiny. In this section, we review the indicators and methodologies of different ranking systems. The latest published criteria, indicators and methodologies are reproduced in the appendices.

Four global rankings are explored. These are:

- Academic Ranking of World Universities (ARWU) also known as Shanghai ranking (since 2003)

- Quacquarelli Symonds (QS) (since 2009 by its own) in both its world rankings and Arab region rankings

- Times Higher Education (THE) (since 2004)

- U-Multirank (since 2014)

Academic Ranking of World Universities

The methodology, criteria and data sources for the ARWU ranking in 2020 are provided in Appendix A (page 16). Four main criteria are used to perform the ranking:

- Quality of Education

- Quality of Faculty

- Research Output

- Per Capita Performance

Each criterion has a set of indicators. Mainly, the Quality of Education is indicated by the number of university's alumni granted a Nobel Prize or a Fields Medal. For the Quality of Faculty two major indicators are defined: staff winning Nobel Prize and Fields Medal and, researchers having citations categorized in specific subjects. The number of published papers in Nature and Science and the number of indexed papers in the Science Citation Index and Social Sciences Citation Index permit to assess the Research Output. The Per Capita Performance is a weighted combination of five indicators related to the number of full-time academic staff of a university.

The data for the ranking are only acquired through websites. ARWU focuses mainly on research and innovation. Quality teaching is nearly absent. The high weight of Nobel Prize, which contributes 30% of the score, makes most universities score less with

ARWU. Only elite universities can be included in the ranking which excludes the majority of the institutions worldwide, however its methodology is considered to be scientifically sound, stable and transparent.

Times Higher Education

The methodology, criteria and data sources for the THE World Rankings in 2020 are provided in Appendix B (page 19). Thirteen indicators are used in the ranking. They are grouped in five areas (criteria) which are:

- Teaching: The learning environment (30%)

- Research: The volume, income and reputation (30%)

- Citations: The research influence (30%)

- International outlook: The staff, students and research (7.5%)

- Industry income: The knowledge transfer (2.5%)

This shows a high level of comprehensiveness in the university evaluation. THE ranking incorporates teaching as a criterion with a weight of 30%. For the evaluation of research Times only considers *Scopus* databases which might be seen as a limitation. The ranking excludes universities with no undergraduate programmes and universities with less than a 1000 scientific articles over a period of five years.

Surveys form a main source of data for the Times ranking. They contribute a total of 33% of the score. This aspect is debatable since surveys can introduce biases and random errors of data collection.

Normalisation is another debatable point in the Times rankings. Actually, more than 50 percent of the indicators are normalised. The normalization procedures are not precisely defined and there is no precise study showing the effects of the applied procedures.

The overall THE World University Rankings are accompanied by a series of subject-specific rankings in the areas of:
- Arts and humanities
- Business and economics
- Computer science
- Clinical and health
- Education
- Engineering
- Law
- Life sciences

- Physical sciences
- Psychology
- Social sciences

In 2019, THE launched their first Impact Rankings, the only global league table that assess universities against the United Nations' Sustainable Development Goals (SDGs). They use carefully calibrated indicators to provide comprehensive and balanced comparisons across four broad areas: research, outreach, stewardship and teaching.

Quacquarelli Symonds

The methodology, criteria and data sources for the QS World and Arab-region rankings in 2020 are provided in Appendix C (page 23). The QS World University Ranking is based on six criteria (metrics). They are:

- Academic reputation

- Employer reputation

- Faculty/student ratio

- Citations per faculty

- International faculty ratio

- International student ratio

The QS ranking (started as a joint effort with Times ranking) also offers a good level of comprehensiveness in the university evaluation. It provides also an annual regional-based ranking using specific sets of metrics that fit better the regional purposes. This proves the need to better consider the local context in the university evaluation. The Arab-region rankings were first published in 2014. The metrics used in the Arab-region are (see Appendix C page 23):

- Academic reputation

- Employer reputation

- Faculty/student ratio

- Citations per paper

- Papers per faculty

- Proportion of staff with PhD

- International Research network

- Proportion of International faculty

- Proportion of International students

- Web impact

The regional indicators take into consideration specific attributes of the Arab higher education such as: i/ some of academic staff do not hold a PhD, ii/ research activities are not strong, iii/ weak international dimension, etc.

Similar to the Times ranking, the QS ranking makes intensive use of surveys. They contribute a total of 50% of the score. As for the Times, this use of surveys is debatable on response rate, fairness and weights.

Multiple indicators are another questionable point regarding the QS ranking. Actually, universities that are close to one another in terms of scores and indicators do not necessarily have the same features.

In addition, QS Graduate Employability Rankings is a tool that compares university performance in terms of graduate employability outcomes and prospects.

U-Multirank

The methodology, criteria and data sources for the U-Multirank ranking in 2020 are provided in Apprendix D (page 25). U-Multirank is multi-dimensional and compares universities in the different activities they are engaged in. The dimensions considered are:

- Teaching and learning

- Research

- International orientation

- Regional engagement

- Knowledge Transfer

Unlike the previous rankings, U-Multirank does not produce a unique weighted score across the different dimensions of performance. The methodology aims rather to help the universities to identify their level on each dimension. It produces, on each dimension, the performance of a university, by comparing it to all others out of a five level scale ("very good" through to "weak"). This information is provided to support the different stakeholders (students, university administrators, policy-makers, academics, business leaders etc) in their decision making.

U-Multirank is stakeholder-oriented. The different indicators are adopted after discussions with the stakeholders who can propose new indicators or suggest the modification of the existing ones. Moreover, ranking can be obtained for a particular discipline or a group of programmes. This fits well with the diversity of higher education where some institutions have strengths in some disciplines and weaknesses in others. In addition, it has an interesting feature through allowing the comparison with other institutions that share similar profiles; which is, to some extent, more meaningful.

As for the previous rankings, U-Multirank uses different data sources. These include ratings, quantitative measures and surveys.

Comparison

Comparing the criteria and indicators of the four rankings, the following comments can be formulated:

- Scope: ARWU is exclusively for elite universities and is research oriented. THE and QS are more comprehensive. U-Multirank has the largest scope and offers a better understanding of strengths and weaknesses on different dimension.

- Precision: The intensive use of surveys in THE and QS with a contribution 30% and 50% to score is questionable and subjective. The response rate, the fairness and the weights are debatable. Rankings system extract publication data from specific databases. For example, the QS rankings uses Scopus and U-Multirank uses Web of Science. These databases do not offer full coverage.

- Fitness for purpose: Fundamentally, the fitness for purpose is weakly considered as the purpose cannot be so global and is not taking into account the local operating context of a university. The trend to develop regional rankings[1] with customised criteria and indicators by QS responds to the clear need for considering the local operating context. U-Multirank in this regard has the most advanced tools. Actually it permits the ranking within a set of similar institutions. It is also worth noting that important elements related to societal issues (employability of graduate, gender balance, tuition fees, community service, etc.) are poorly considered in most ranking indicators. Only U-Multirank justly

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[1] THE will begine its Arab region rankings in 2021

considers these aspects even if other rankings fairly consider some of these aspects[2].

- Combination of measurements: Targeting a unique score for ranking requires the definition of a combination of scores with appropriate weights. The weights correspond to subjective[3] relative importance between different criteria and indicators. Normalization of individual scores is also subject to discussion and criticisms. This is particularly the case of THE ranking. In comparison, U-Multirank offers a dimension based ranking without complex combinations. However, it does not summarise the whole evaluation with a unique score.

In order to understand the variations in the rankings across years Table 1 and Table 2 report the top 10 and top 31-40 universities of the four global rankings (ARWU, THE, QS World and QS Arabic region) for two years 2019 and 2020 respectively. For the same ranking, the variations are small between the two years 2019 and 2020 for the top 10 and increase as we go down in the range, such as the case in the 31-40 top institutions. Moreover, the differences across different rankings are larger. Moreover, comparing the ranking results for Lebanon, Table 4 shows large differences between World and regional rankings as conducted by QS. This proves the importance of the choice of criteria and indicators.

Table 1. Top 10 Universities according to the four global rankings for 2019 and 2020

2019				2020			
ARWU	THE World	QS World	QS Arab	ARWU	THE World	QS World	QS Arab
Harvard	Oxford	MIT	King Fahd Petroleum	Harvard	Oxford	MIT	KAU
Stanford	Cambridge	Stanford	AUB	Stanford	Caltech	Stanford	AUB
Cambridge	Stanford	Harvard	KAU	Cambridge	Cambridge	Harvard	King Fahd Petroleum
MIT	MIT	Caltech	King Saud	MIT	Stanford	Oxford	Qatar University
Berkeley	Caltech	Oxford	UAE University	Berkeley	MIT	Caltech	UAE University
Princeton	Harvard	Cambridge	Qatar University	Princeton	Princeton	ETZH	King Saud
Oxford	Princeton	ETZH	AUS	Columbia	Harvard	Cambridge	AUS
Columbia	Yale	Imperial College	AUC	Caltech	Yale	UCL	Sultan Qaboos
Caltech	Imperial College	Chicago	Jordan	Oxford	Chicago	Imperial College	AUC
Chicago	Chicago	UCL	Sultan Qaboos	Chicago	Imperial College	Chicago	Jordan

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[2] E.g. QS stresses upon the Graduate Employability
[3] Based on stakeholders inputs

Table 2. Ranked 31-40 Universities according to the four global rankings for 2019 and 2020

2019				2020			
ARWU	THE World	QS World	QS Arab	ARWU	THE World	QS World	QS Arab
Edinburgh	Peking	King's College	Arabian Gulf	North Carolina	California San Diego	NorthWestern	Mansoura
Kyoto	LMU Munich	UCLA	Assiut	Wisconsin	LMU Munich	Hong Kong S&T	Assiut
Manchester	Melbourne	McGill	Yarmouk	Copenhagen	Melbourne	King's College	King Faisal
North Carolina	Georgia Tech	NorthWestern	USEK	Kyoto	British Columbia	Kyoto	Arabian
Rockefeller	EPFL	Kyoto	NDU	Melbourne	Hong Kong	McGill	Kufa
British Columbia	Hong Kong	Seoul	UOB	PSL	King's College	UCLA	UOB
Paris-Sud	British Columbia	Hong Kong S&T	Babylon	Manchester	Tokyo	Seoul	Applied Science Bahrain
Karolinska Institute	King's College	LSE	Hashemite	British Columbia	EPFL	Melbourne	AlFaisal
Colorado at Boulder	Texas at Austin	Melbourne	AlFaisal	Sorbonne	Georgia Tech	NYU	Hashemite
Illinois at Urbana Champaign	Karolinska	KAIST	Basrah	Minnesota	Texas at Austin	Fudan	Abdulrahman Bin Faisal

Critical analysis

It is largely admitted that university rankings have a major influence in decision making at different levels. However, criticisms have been formulated in different studies.

Articles

Lin et al. [2] analyse the articles and citations counting method that has a big impact on rankings in general. Open questions exist regarding authors order and multiple affiliations. Moreover, the use of specific databases in some rankings may influence some decisions to promote or even impose publication of research outcomes in journals and conferences indexed in those databases.

Citations

Another problem with the high weight given to the volume of publications has been recently balanced by the number citations. What about self-citations? Extreme cases in this domain have been reported in [3][4]. Universities might be tempted to hire highly-cited researchers to increase their ranking level. These researchers can also be retired from their universities in some cases.

Scoring

Several questions have been formulated previously. The use of surveys and the normalisation of score appear as debatable. The variations across rankings (as identified previously) have been studied in [5]. The study shows that only 35 institutions appear jointly in the top 100 of five rankings in 2017.

Correlation

It is unfortunate that correlation between indicators and measurements are not being extensively used. Such correlations would permit to increase the resilience of the rankings.

Fit for purpose

As mentioned earlier the rankings in general are global and do not take into consideration the local context. However, they influence decisions taken locally. This can be a source of bias and may lead to counterproductive measures.

Merits and Demerits of rankings

In [1] the merits and demerits of rankings are studied. Here, we provide a short summary.

Positive impact

Rankings offer accessible, manageably packaged and relatively simple information on the quality of higher education institutions. This responds to the growing demand for such information and forms the major merit of rankings. This information is useful for all stakeholders. Students may use it in their search for a programme to enrol in. Donors may use the rankings results to better place their endowments. Decision makers may use the rankings in order to better and comparatively understand their strengths and weaknesses. Policy makers nationally can also use the rankings in order to adjust their policies.

Rankings have also encouraged transparency of information and accountability of higher education institutions.

Several study cases have shown that rankings had positive impacts at institutional and systematic levels. They demonstrate a "pull-up" factor on universities lacking in some criteria and provide incentive to well performing universities to keep on efforts to sustain their levels.

Possible misuses

Rankings can draw universities' attention away from teaching and social responsibility towards research or even scientific research. They can also lead to bias in making

decisions, thus pulling them away from the demands of the immediate local context to respond to the imperatives of globalisation.

Rankings are also criticised for their unfairness. They tend to favour the advantage enjoyed by the best established institutions.

Criticisms are also formulated regarding the methodology as mentioned previously. In [6], the authors studied to what extent the indicators used in ARWU, THE, and QA are corruptible. They classified the parameters into three classes: Non-corruptible, Corruptible and Highly Corruptible. They are listed in the following table.

Table 3. Classification of ARWU, THE and QS criteria as non corruptible, corruptible and highly corruptible as shown in [6]

Non Corruptible	Corruptible	Highly Corruptible
Nature, Science publication (ARWU)	Research (THE)	Citations (THE)
Per Capita Score (ARWU)	Teaching (THE)	International students (QS)
Alumni with Nobel Prize or Fields Medals (ARWU)	Academic reputation (QS)	International faculties (QS)
Faculty awarded Nobel Prize or Fields Medals (ARWU)	High Citation (ARWU)	International outlook (THE)
	Publications (ARWU)	Faculty/student ratio (QS)
	Employer reputation (QS)	
	Citations per faculty (QS)	
	Industry income (THE)	

While most of the international rankings, if not all provides a rank per indicator, the computation of a final rank as a combination of what is delivered by each indicator may be misleading to non-informed or unaware stakeholders. In this perspective, by avoiding the production of a final rank, the U-Multirank pushes the stakeholders as well as the participants to deepen the understanding of the strengths and weaknesses.

Rankings and Accreditation in the Lebanese Higher Education

Many Lebanese universities have been accredited at institutional level by international quality assurance agencies. Moreover, several higher education programmes have also been evaluated and accredited by prestigious agencies.

At the ranking level, the results for 2019 and 2020 are reported in Table 4. As mentioned earlier, the ranking results show variation between the rankings and across the years. It is to be noted that some institutions and in particular AUB has a good ranking position at international and regional levels. This being said, it is worth noting that the number of

ranked institutions remain small compared to around fifty institutions operating in higher education in Lebanon.

Table 4. Top Lebanese universities in the four global rankings for 2019 and 2020

2019				2020			
ARWU	THE World	QS World	QS Arab	ARWU	THE World	QS World	QS Arab
AUB 601-700	AUB 401-500	AUB 237	AUB 2	AUB 601-700	AUB 351-400	AUB 244	AUB 2
	LAU 601-800	USJ 500	LAU 16		LAU 801-1000	USJ 561-570	LAU 15
		UOB 591-600	USJ 20		USJ 801-1000	LAU 581-590	USJ 18
		LAU 601-650	LU 26			UOB 581-590	LU 25
		USEK 651-700	USEK 34			USEK 601-650	NDU 28
			NDU 35			BAU 801-1000	USEK 30
			UOB 35			NDU 801-1000	UOB 36
			BAU 71-80				BAU 48

Conclusions

This document provides an overview of four rankings system. It also offers a critical comparative analysis of the defined indicators and procedures to the rankings. It stresses upon the relevance of the rankings in general and their positive impacts but also the possible misuses. The appendices recall the criteria, indicators and methodologies for the fours rankings ARWU, THE, QS and U-Multirank.

We have also explored the merits and demerits of rankings. In summary, rankings when used correctly offer a good understanding of the strengths and weaknesses of the institutions and programmes. However, awareness must be raised and stakeholders have to be trained to critically read rankings results in order not to be misled with fast interpretation of few numbers. Moreover, rankings can be very useful for improvement. The fact is, when preparing the data for the rankings the institutions engage in a process of self assessment similar to what occurs in external assessment for quality assurance. Ideally, the rankings outcomes and observation should inform the policy making at

programmatic, institutional and national levels. This also requires to have dedicated procedures and processes.

Bibliography and Suggested Readings

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Appendix A – ARWU Criteria, Indicators and Methodology

The information reported here is published on the ARWU[4] website and corresponds to the methodology adopted in 2020 ranking.

Citeria and Weights

Universities are ranked by several indicators of academic or research performance, including alumni and staff winning Nobel Prizes and Fields Medals, highly cited researchers, papers published in Nature and Science, papers indexed in major citation indices, and the per capita academic performance of an institution. For each indicator, the highest scoring institution is assigned a score of 100, and other institutions are calculated as a percentage of the top score. The distribution of data for each indicator is examined for any significant distorting effect; standard statistical techniques are used to adjust the indicator if necessary. Scores for each indicator are weighted as shown below to arrive at a final overall score for an institution. The highest scoring institution is assigned a score of 100, and other institutions are calculated as a percentage of the top score. An institution's rank reflects the number of institutions that sit above it.

Table 5. Indicators and Weights for ARWU

Criteria	Indicator	Code	Weight
Quality of Education	Alumni of an institution winning Nobel Prizes and Fields Medals	Alumni	10%
Quality of Faculty	Staff of an institution winning Nobel Prizes and Fields Medals	Award	20%
	Highly cited Researchers	HiCi	20%
Research Output	Papers published in Nature and Science	N&S	20%
	Papers indexed in Science Citation Index-Expanded and Social Science Citation Index	PUB	20%
Per Capita Performance	Per capita academic performance of an institution	PCP	10%
Total			100%

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[4] http://www.shanghairanking.com/ARWU-Methodology-2020.html

Definition of Indicators

Table 6. Indicators of ARWU

Indicator	Definition
Alumni	The total number of the alumni of an institution winning Nobel Prizes and Fields Medals. Alumni are defined as those who obtain bachelor's, master's or doctoral degrees from the institution. Different weights are set according to the periods of obtaining degrees. The weight is 100% for alumni obtaining degrees after 2011, 90% for alumni obtaining degrees in 2001-2010, 80% for alumni obtaining degrees in 1991-2000, and so on, and finally 10% for alumni obtaining degrees in 1921-1930. If a person obtains more than one degrees from an institution, the institution is considered once only.
Award	The total number of the staff of an institution winning Nobel Prizes in Physics, Chemistry, Medicine and Economics and Fields Medal in Mathematics. Staff is defined as those who work at an institution at the time of winning the prize. Different weights are set according to the periods of winning the prizes. The weight is 100% for winners after 2011, 90% for winners in 2001-2010, 80% for winners in 1991-2000, 70% for winners in 1981-1990, and so on, and finally 10% for winners in 1921-1930. If a winner is affiliated with more than one institution, each institution is assigned the reciprocal of the number of institutions. For Nobel prizes, if a prize is shared by more than one person, weights are set for winners according to their proportion of the prize.
HiCi	The number of Highly Cited Researchers selected by Clarivate Analytics. The Highly Cited Researchers list issued in December 2019 was used for the calculation of HiCi indicator in ARWU 2020. Only the primary affiliations of Highly Cited Researchers are considered.
N&S	The number of papers published in Nature and Science between 2015 and 2019. To distinguish the order of author affiliation, a weight of 100% is assigned for corresponding author affiliation, 50% for first author affiliation (second author affiliation if the first author affiliation is the same as corresponding author affiliation), 25% for the next author affiliation, and 10% for other author affiliations. When there are more than one corresponding author addresses, we consider the first corresponding author address as the corresponding author address and consider other corresponding author addresses as first author address, second author address etc. following the order of the author addresses. Only publications of 'Article' type is considered.
PUB	Total number of papers indexed in Science Citation Index-Expanded and Social Science Citation Index in 2019. Only publications of 'Article' type is considered. When calculating the total number of papers of an institution, a special weight of two was introduced for papers indexed in Social Science Citation Index.
PCP	The weighted scores of the above five indicators divided by the number of full-time equivalent academic staff. If the number of academic staff for institutions of a country cannot be obtained, the weighted scores of the above five indicators is used. For ARWU 2020, the numbers of full-time equivalent academic staff are obtained for institutions in USA, UK, France, Canada, Japan, Italy, Australia, Netherlands, Sweden, Switzerland, Belgium, South Korea, Czech, Slovenia, New Zealand etc.

Data Sources

Table 7. Data Sources for ARWU

Indicator	Data Source
Nobel Prize	http://www.nobelprize.org/
Fields Medals	http://www.mathunion.org/
HiCi	https://clarivate.com/hcr/
N&S	http://www.webofscience.com/
PUB	http://www.webofscience.com/
Others	Number of academic staff data is obtained from national agencies such as National Ministry of Education, National Bureau of Statistics, National Association of Universities and Colleges, National Rector's Conference.

Appendix B – THE Criteria, Indicators and Methodology

The information reported here is published on the THE[5] website and corresponds to the methodology adopted in 2020 ranking.

Criteria and Weights

Table 8. Indicators and Weights for THE

Criteria (*Areas*)	Indicators (*Sub Criteria*)	Weight	
Teaching (*The learning environment*)	• Reputation Survey • Staff-to-Student Ratio • Doctorate-to-Bachelor's Ratio • Doctorates-Awarded-to-Academic-Staff Ratio • Institutional Income	15% 4.5% 2.25% 6% 2.25%	**30%**
Research (*Volume, Income, reputation*)	• Reputation Survey • Research Income • Research Productivity	18% 6% 6%	**30%**
Citations (*research influence*)			**30%**
International Outlook (*staff, students, research*)	• Proportion of International Students • Proportion of International Staff • International Collaboration	2.5% 2.5% 2.5%	**7.5%**
Industry Income (*knowledge transfer*)			**2.5%**
Total			**100%**

Data Sources and Methodology

Teaching

The most recent Academic Reputation Survey (run annually) that underpins this category was carried out between November 2018 and March 2019. It examined the perceived prestige of institutions in teaching. The responses were statistically representative of the global academy's geographical and subject mix. The 2019 data are combined with the results of the 2018 survey, giving more than 21,000 responses.

As well as giving a sense of how committed an institution is to nurturing the next generation of academics, a high proportion of postgraduate research students also suggests the provision of teaching at the highest level that is thus attractive to graduates and effective at developing them. This indicator is normalised to take account of a

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5   https://www.timeshighereducation.com/world-university-rankings/world-university-rankings-2020-methodology

university's unique subject mix, reflecting that the volume of doctoral awards varies by discipline.

Institutional income is scaled against academic staff numbers and normalised for purchasing-power parity (PPP). It indicates an institution's general status and gives a broad sense of the infrastructure and facilities available to students and staff.

Research

The most prominent indicator in this category looks at a university's reputation for research excellence among its peers, based on the responses to our annual Academic Reputation Survey.

Research income is scaled against academic staff numbers and adjusted for purchasing-power parity (PPP). This is a controversial indicator because it can be influenced by national policy and economic circumstances. But income is crucial to the development of world-class research, and because much of it is subject to competition and judged by peer review, our experts suggested that it was a valid measure. This indicator is fully normalised to take account of each university's distinct subject profile, reflecting the fact that research grants in science subjects are often bigger than those awarded for the highest-quality social science, arts and humanities research.

To measure productivity we count the number of publications published in the academic journals indexed by Elsevier's Scopus database per scholar, scaled for institutional size and normalised for subject. This gives a sense of the university's ability to get papers published in quality peer-reviewed journals. Last year, we devised a method to give credit for papers that are published in subjects where a university declares no staff.

Citations

Our research influence indicator looks at universities' role in spreading new knowledge and ideas.

We examine research influence by capturing the average number of times a university's published work is cited by scholars globally. This year, our bibliometric data supplier Elsevier examined 77.4 million citations to 12.8 million journal articles, article reviews, conference proceedings, books and book chapters published over five years. The data include more than 23,400 academic journals indexed by Elsevier's Scopus database and all indexed publications between 2014 and 2018. Citations to these publications made in the six years from 2014 to 2019 are also collected.

The citations help to show us how much each university is contributing to the sum of human knowledge: they tell us whose research has stood out, has been picked up and built on by other scholars and, most importantly, has been shared around the global

scholarly community to expand the boundaries of our understanding, irrespective of discipline.

The data are normalised to reflect variations in citation volume between different subject areas. This means that institutions with high levels of research activity in subjects with traditionally high citation counts do not gain an unfair advantage.

We have blended equal measures of a country-adjusted and non-country-adjusted raw measure of citations scores.

In 2015-16, we excluded papers with more than 1,000 authors because they were having a disproportionate impact on the citation scores of a small number of universities. In 2016-17, we designed a method for reincorporating these papers. Working with Elsevier, we developed a fractional counting approach that ensures that all universities where academics are authors of these papers will receive at least 5 per cent of the value of the paper, and where those that provide the most contributors to the paper receive a proportionately larger contribution.

International Outlook

The ability of a university to attract undergraduates, postgraduates and faculty from all over the planet is key to its success on the world stage.

In the third international indicator, we calculate the proportion of a university's total research journal publications that have at least one international co-author and reward higher volumes. This indicator is normalised to account for a university's subject mix and uses the same five-year window as the "Citations: research influence" category.

Industry Income

A university's ability to help industry with innovations, inventions and consultancy has become a core mission of the contemporary global academy. This category seeks to capture such knowledge-transfer activity by looking at how much research income an institution earns from industry (adjusted for PPP), scaled against the number of academic staff it employs.

The category suggests the extent to which businesses are willing to pay for research and a university's ability to attract funding in the commercial marketplace – useful indicators of institutional quality.

Exclusions

Universities can be excluded from the World University Rankings if they do not teach undergraduates, or if their research output amounted to fewer than 1,000 relevant publications between 2014 and 2018 (with a minimum of 150 a year). Universities can

also be excluded if 80 per cent or more of their research output is exclusively in one of our 11 subject areas.

Data Collection

Institutions provide and sign off their institutional data for use in the rankings. On the rare occasions when a particular data point is not provided, we enter a conservative estimate for the affected metric. By doing this, we avoid penalising an institution too harshly with a "zero" value for data that it overlooks or does not provide, but we do not reward it for withholding them.

Getting to the Final Result

Moving from a series of specific data points to indicators, and finally to a total score for an institution, requires us to match values that represent fundamentally different data. To do this, we use a standardisation approach for each indicator, and then combine the indicators in the proportions indicated in the table.

The standardisation approach we use is based on the distribution of data within a particular indicator, where we calculate a cumulative probability function, and evaluate where a particular institution's indicator sits within that function.

For all indicators except for the Academic Reputation Survey, we calculate the cumulative probability function using a version of Z-scoring. The distribution of the data in the Academic Reputation Survey requires us to add an exponential component.

Appendix C – QS Criteria, Indicators and Methodology

The information reported here is published on the QS website and corresponds to the methodology adopted for World University Rankings[6] and the Arab region rankings[7] in 2020.

Criteria and Weights

The following table presents the criteria used and their corresponding weights for both world and Arab region rankings.

Table 9. QS criteria (Metrics) and the corresponding weights for both World and Arab region rankings

World Criteria (*Metrics*)	Weight	Arab Region Criteria (*Metrics*)	Weight
Academic Reputation	40%	Academic Reputation	30%
Employer Reputation	10%	Employer Reputation	20%
Faculty/Student Ratio	20%	Faculty/Student Ratio	15%
Citations per Faculty	20%	Citations per paper	5%
		Papers per Faculty	5%
		Proportion of staff with PhD	5%
		International Research Network	10%
International Faculty Ratio	5%	Proportion of International Faculty	2.5%
International Student Ratio	5%	Proportion of International Students	2.5%
		Web Impact	5%
Total	**100%**	**Total**	**100%**

Data Sources and Methodology

The following tables summarize the data sources and methodology adopted by QS for world and Arab region rankings respectively.

Table 10. Data sources and methodology in scoring criteria (Metrics) in QS world rankings

Criteria (*Metrics*)	Definition, Data Sources and Methodology
Academic Reputation	*Based on QS <u>Academic Survey</u>, it collates the expert opinions of over 100,000 individuals in the higher education space regarding teaching and research quality at the world's universities.*
Employer Reputation	*Employer Reputation metric is based on almost 50,000 responses to QS Employer Survey, and asks employers to identify those institutions from which they source the most competent, innovative, effective graduates. The QS Employer Survey is also the world's largest of its kind.*
Faculty/Student Ratio	*It assesses the extent to which institutions are able to provide students with meaningful access to lecturers and tutors, and recognizes that a high number of faculty members per student will reduce the teaching burden on each individual academic.*

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[6] https://www.topuniversities.com/qs-world-university-rankings/methodology
[7] https://www.topuniversities.com/arab-region-rankings/methodology

Citations per Faculty	To calculate it, we take the total number of citations received by all papers produced by an institution across a five-year period by the number of faculty members at that institution.
	To account for the fact that different fields have very different publishing cultures – papers concerning the Life Sciences are responsible nearly half of all research citations as of 2015 – we normalize citations. This means that a citation received for a paper in Philosophy is measured differently to one received for a paper on Anatomy and Physiology, ensuring that, in evaluating an institution's true research impact, both citations are given equal weight.
	All citations data is sourced using Elsevier's Scopus database, the world's largest repository of academic journal data. This year, QS assessed 138 million citations from 18.5 million papers once self-citations were excluded.
International Faculty ratio International Student Ratio	It demonstrates an ability to attract faculty and students from across the world, which in turn suggests that it possesses a strong international brand. It implies a highly global outlook: essentially for institutions operating in an internationalised higher education sector.

Table 11. Data sources and methodology in scoring criteria (Metrics) in QS Arab region rankings

Criteria (*Metrics*)	Definition, Data Sources and Methodology
Academic Reputation	This is based on a major global survey of academics, who are asked to name the universities they believe to be producing the best work in their own field of expertise.
Employer Reputation	This is based on a second major global survey, this time of graduate employers. Participants are asked to name the institutions they perceive to be producing the best graduates.
Faculty/Student Ratio	This indicator assesses the number of full-time academics employed relative to students enrolled.
Citations per paper	Calculated using data from Scopus, this indicator assesses the number of citations per paper published, reflecting the impact of each institution's research.
Papers per Faculty	Based on the Scopus database, this measure relates to the number of papers published per faculty member, reflecting research productivity rates.
Proportion of staff with PhD	This is based on the proportion of faculty members holding a PhD or equivalent, reflecting the overall level of expertise and experience within the institution.
International Research Network	Using data provided by Scopus, this indicator assesses the degree of international openness in terms of research collaboration for each evaluated institution. To calculate this indicator the Margalef Index, widely used in the environmental sciences, has been adapted to produce a score that gives an indication of the diversity of an institution's research collaborations with other institutions in different locations of the world.
Proportion of International Faculty Proportion of International Students	These indicators reflect each institution's success in attracting academics and students from other countries, giving an indication of the international diversity of its learning environment.
Web Impact	This is based on the Webometrics ranking. This indicator reflects universities' online presence, providing an indication of their commitment to international engagement and communication.

Appendix D – U-Multirank Criteria, Indicators and Methodology

The information reported here is published on the U-Multirank website[8].

Criteria and Indicators

The following Table provides the criteria and corresponding indicators.

Table 12. Indicators of U-Multirank

Indicators by Criterion	Definition
General	
Total number of students	Total number of students in the degree programme
Students in 1st year	Number of first-year students in the degree programme
International students	Number of international students in the degree programme
Total number of students in field (major)	Total number of students taking the subject at the department, excluding minor subject students
Percentage of female students	Percentage of female students enrolled at the department
Academic staff (FTE)	Number of full-time equivalent academic staff at the institution
Period of study	The normative period of study for the degree programme (years)
Tuition fees for national students	Tuition fees national students are being charged
Tuition fees for international students	Tuition fees international students are being charged
Female academic staff	The number of female academic staff as a percentage of total number of academic staff
Teaching & Learning	
Student/Staff ratio	The number of students (headcount) per member of the academic staff (fte). Staff solely involved in research is excluded
Graduating on time (Bachelors)	The percentage of graduates that graduated within the time expected (normative time) for their bachelor programme
Graduating on time (Masters)	The percentage of graduates that graduated within the time expected (normative time) for their masters programme
Academic staff with doctorates	The percentage of academic staff holding a doctorate (PhD or equivalent)
Contact with work environment (bachelors)	A composite measure representing at bachelor level: (1) the inclusion of internships / phases of practical experience or external projects in the curriculum; (2) the percentage of students doing an internship; (3) teaching by practitioners from outside the university departments; and, (4) the percentage of degree theses made in cooperation with industry/external organisations
BA graduation rate	The percentage of new entrants that successfully completed their bachelor programme
MA graduation rate	The percentage of new entrants that successfully completed their master programme
BA graduates in normative time	The percentage of graduates that graduated within the time expected (normative time) of their bachelor programme
MA graduates in normative time	The percentage of graduates that graduated within the time expected (normative time) of their masters programme
Relative BA graduate unemployment	The percentage of bachelor graduate unemployment 18 months after graduation
Relative MA graduate unemployment	The percentage of master graduate unemployment 18 months after graduation

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8 https://www.umultirank.org/about/methodology/our-approach/

Contacts with work environment	A composite measure representing at bachelor level: (1) the inclusion of internships/phases in work; and (2) the percentage of students doing an internship; and (3) teaching by practitioners from outside university departments
Contact with work environment (Masters)	A composite measure representing at bachelor level: (1) the inclusion of internships / phases of practical experience or external projects in the curriculum; (2) the percentage of students doing an internship; (3) teaching by practitioners from outside the university departments; and, (4) the percentage of degree theses made in cooperation with industry/external organizations
Graduates in normative time	Percentage of graduates that graduated within the normative time to degree for their programme
Relative rate of graduate unemployment	Percentage of unemployment of graduates 18 months after graduation
Hospital beds available for teaching	The number of beds available for teaching at university hospitals and affiliated hospitals per 100 students
Innovative forms of teaching and assessment	The percentage of exminations (in medical doctor training programmes) which use innovative forms of assessment (assessment of practical work by faculty and strctured clinical cases)
Graduation rate long first degree	The percentage of new entrants that successfully completed their long first degree programme
Graduating on time (long first degree)	The percentage of graduates who graduated within the time expected (normative time) of their long first degree programme
Relative graduate unemployment long first degree	The percentage of long first degree programme graduate unemployment 18 months after graduation
Community service learning	The percentage of credits given in service-learning activities, in relation to total number of credits. Service-learning involves students in community service activities and applies the experience to personal and academic development
Gender equality	The likelihood of female/male students to take a PhD degree. A zero means that the genders stand equal chances to gain a PhD degree
Overall learning experience	An assessment of the quality of the overall learning experience, based on a satisfaction survey
Quality of courses & teaching	An assessment of the quality of teaching provision, based on a student satisfaction survey
Organisation of program	An assessment of the organisation of the programme, based on a student satisfaction survey
Contact with teachers	An assessment of the feedback given by teachers, based on a student satisfaction survey
Inclusion of work/practical experience	An assessment of the inclusion of work experience and of elements related to work practice, based on a student satisfaction survey
Library facilities	An assessment of the quality of library services for students, based on a student satisfaction survey
Laboratory facilities	An assessment of the quality of laboratories available to students, based on a student satisfaction survey
IT provision	An assessment of the quality of IT services for students, based on a student satisfaction survey
Room facilities	An assessment of lecture halls and seminar rooms, based on a student satisfaction survey
Linking clinical/preclinical teaching	An assessment of the integration of pre-clinical/theoretical and clinical courses, based on a student satisfaction survey
Skills labs	An assessment of the skills labs and training centers concerning maintenance, accessibilty, technical facilities and mentoring, based on a student satisfaction survey
Bedside teaching	An assessment of bedside teaching, based on a student satisfaction survey
Inclusion of practical experience/clerkships	An assessment of the integration of practical experience with patient contact into the öearning experience, based on a student satisfaction survey
Digital teaching	An assessment of the quality of digital teaching, based on a student satisfaction survey

Research	
External research income	Research revenue that is not part of a core (or base) grant received from the government. Includes research grants from national and international funding agencies, research councils, research foundations, charities and other non-profit organisations. Measured in €1,000s using Purchasing Power Parities (PPP). Expressed per fte academic staff
Doctorate productivity	The number of doctoral degrees, relative to the number of academic staff (FTE)
Research publications (absolute numbers)	The number of the department's research publications indexed in the Web of Science Core Collection database, where at least one author is affiliated to the source university
Citation rate	The average number of times the department's research publications are cited in other research published in the respective reference period, adjusted (normalised) at global level for the field of science and the year in which a publication appeared
Top cited papers	The proportion of the department's research publications that, compared to other publications in the same field and in the same year, belong to the top 10% most frequently cited ones
Interdisciplinary publications	Percentage of the department's research publications within the field's top 10% publications with the highest interdisciplinarity scores
Research orientation of teaching	An assessment of degree to which the education is informed by research in the field, based on a student satisfacton survey
Research publications (size-normalised)	The number of research publications (indexed in the Web of Science database), where at least one author is affiliated to the university expressed in relation to the number of students
Art related output	The number of scholarly outputs in the creative and performing arts, relative to the full-time equivalent (FTE) number of academic staff
Professional publications	The number of professional publications per fte academic staff. Professional publications are all publications published in journals, books, and other media that are addressed to a professional audience and that can be traced bibliographically
Strategic research partnerships	The number of strategic partnerships per FTE academic staff
Open Access publications	Share of open access publications out of all publications of an institution
International Orientation	
International orientation of bachelor programmes	A composite measure taking into account (1) the existence of joint/dual degree programmes; (2) the inclusion of study periods abroad; (3) the percentage of international (degree and exchange) students; and (4) the percentage of international academic staff
International orientation of master programmes	A composite measure taking into account (1) the existence of joint/dual degree programmes; (2) the inclusion of study periods abroad; (3) the percentage of international (degree and exchange) students; and (4) the percentage of international academic staff
Opportunities to study abroad	An assessment of the opportunities for studying abroad, based on a student satisfaction survey
International doctorate degrees	The percentage of doctorate degrees that were awarded to international doctoral candidates
International joint publications	The percentage of the department's research publications that list at least one affiliate author's address abroad
International research grants	The proportion of external research revenue from abroad – including public and private funding organisations and businesses
Foreign language BA programs	The percentage of bachelor programmes that are offered in a foreign language
Student mobility	A composite of international incoming exchange students, outgoing exchange students and students in international joint degree programmes
International academic staff	The percentage of academic staff (on a headcount basis) with foreign citizenship
International doctorate	The percentage of doctorate degrees that are awarded to international

degrees	doctorate candidates
International joint publications	The percentage of the university's research publications that list at least one affiliate author's address located in another country
Foreign language MA programs	The percentage of masters programmes that are offered in a foreign language
Program international orientation	International orientation of the degree programme: composite of joint/dual degree programmes, inclusion of study periods abroad, international students, international staff, teaching in foreign language
Foreign language long first degree programmes	The percentage of long first degree programmes that are offered in a foreign language
Regional Engagement	
Student internships in the region	Out of the students who did an internship, the percentage for which the internship was with a company or organisation located in the region
Regional joint publications	The percentage of the department's research publications that list at least one co-author with an affiliate address in the same spatial region (within a distance of 50 km from the university)
Income from regional sources	The proportion of external research revenues – apart from government or local authority core/recurrent grants – that comes from regional sources (i.e. industry, private organisations, charities)
BA graduates working in the region	The percentage of bachelor graduates who found their first job (after graduation) in the region where the university is located
Student internships in region	The percentage of all the university's students doing an internship whose internship was with a company or organisation located in the same region as the university
MA graduates working in the region	The percentage of masters graduates who found their first job (after graduation) in the region where the university is located
Graduate employment in the region	Percentage of graduates working in the region 18 months after graduation
Regional publications with industrial partners	The proportion of publications with industrial partners that was published with co-authors from the same region (within a distance of 50 km from the university)
Knowledge Transfer	
Income from private sources	The percentage of external research revenues (incl. not-for profit organisations) coming from private sources, excluding tuition fees
Co-publications with industrial partners	The percentage of a department's research publications that list an author affiliated with an address that refers to a for-profit business enterprise or private sector R&D unit (excludes for-profit hospitals and education organisations)
Publications cited in patents	The percentage of the department's research publications that were cited in the reference list of at least one international patent (as included in the PATSTAT database)
BA theses with regional organisations	Percentage of bachelor theses done in cooperation with private organisations (enterprises/ other external organisations)
MA theses with regional organisations	Percentage of master theses done in cooperation with private organisations (enterprises/ other external organisations)
Industry co-patents	The percentage of the number of patents assigned to (inventors working at) the university during the respective reference period, which were applied for in co-operation with at least one applicant from the industry
Spin-offs	The number of spin-offs (i.e. firms established on the basis of a formal knowledge transfer arrangement between the university and the firm) recently created by the university (per 1000 fte academic staff)
Income from Continuous professional development (CPD)	The percentage of the university's total revenues that is generated from activities delivering Continuous Professional Development courses and training
Patents awarded (absolute numbers)	The number of patents assigned to (inventors working at) the university in the respective reference period
Graduate companies	The number of companies newly founded by graduates per 1000 graduates

Data Sources

The sources of data to complete the ranking are of the following categories:

- **<u>Self-reported data:</u>** *Universities that decided to participate in U-Multirank have provided data for the institution as a whole, as well as for the departments offering degree programmes (if any) related to the selected subject areas covered in 2018, 2019 and 2020 editions of U-Multirank. Both kinds of data were provided through online questionnaires.*

- **<u>Student survey:</u>** *One of the purposes of U-Multirank is to help prospective and increasingly mobile students to make an informed choice about a university. For them the assessment of the learning experience by current students of institutions will provide a unique peer perspective. The 2020 edition of U-Multirank includes data drawn from an online survey of around 130,000 students, asking student opinions about various aspects of their degree programme.*

- **<u>Bibliometric and patent data:</u>** *A number of U-Multirank institutional and field level indicators are based on bibliometric and patent data included in high-quality, comprehensive international databases. This data is produced by the Centre for Science and Technology Studies (CWTS) at Leiden University. All indicator scores derived from bibliometric analysis are based on information extracted from publications that are indexed in the CWTS-licensed edition of the Web of Science (WoS) database (Science Citation Index Expanded, Social Sciences Citation Index, and Arts & Humanities Citation Index). The data underlying the indicator "Publications cited in patents" is collected from the CWTS-licensed edition of the PATSTAT database.*

Rank Group Calculation

U-Multirank indicates how universities perform by showing their position in five performance groups ("very good" through to "weak") for each of some 30 different indicators. For this, it uses five rank groups. The rank groups refer to the distance of the indicator score of an individual institution to the average – or rather the median – performance of all institutions that U-Multirank has data for. With regard to the grouping procedure there are three different types of indicators and rank group calculations:

1. *"Regular" quantitative indicators*

2. *Rating indicators*

3. *Student survey indicators*