

# An introduction to global university rankings



# The globalization of scientific research

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Globalization of science is becoming increasingly prominent, and the number of nodes and ties in the network has substantially increased over time. The traditional science powerhouses have occupied central positions in the network, while the new emergent scientific countries are rising, both driving the evolution of world order<sup>1</sup>.

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A recent report released by the Institute for Scientific Information™ at Clarivate identifies a growing number of research articles in the Web of Science™ with 1,000 or more unique authors across more than 100 different countries.<sup>2</sup> The report also finds that the combination of authors and countries creates a complex authorship pattern that differs from more typical academic papers and drives elevated citation rates.

In the past two decades, there have been dramatic changes in higher education and ideology defining standards and global competitiveness. Combined with the impact of globalization and the development of the global "knowledge economy," these competitive forces have resulted in the global competition phenomenon that is currently reshaping higher education<sup>3</sup>, including:

- The rise of global university rankings
- Declarations by nations to have a world-class university
- The development of regional units of control
- The development of cross-border quality assessment practices
- The internationalization of universities

In this report we discuss the rise in significance of global university rankings, the history of these rankings and provide some context to better understand some of the major ranking systems.

<sup>1</sup> Qinchang, Gui & Liu, Chengliang & Du, Debin. (2019). Globalization of science and international scientific collaboration: A network perspective. *Geoforum*. 105. 1-12. <https://doi.org/10.1016/j.geoforum.2019.06.017>

<sup>2</sup> Adams J, Pendlebury D A, Potter R, Szomszor M. Global Research Report – Multi-authorship and research analytics. Institute for Scientific Information, Clarivate

<sup>3</sup> Rust, Val & Kim, Stephanie. (2015). Globalization and global university rankings. [https://doi.org/10.1007/978-94-017-9493-0\\_11](https://doi.org/10.1007/978-94-017-9493-0_11)

# History and impact of international rankings

Research universities play a critical role in training the professionals, high-level specialists, scientists, and researchers needed by the economy and in generating new knowledge in support of the national innovation system. In this context, policymakers are keen to see their top universities operating at the cutting edge of intellectual and scientific development<sup>4</sup>. The paradox of the world-class university, however, as Altbach has succinctly and accurately observed, is that, "Everyone wants a world-class university. No country feels it can do without one. The problem is that no one knows what a world-class university is, and no one has figured out how to get one."

University rankings emerged as a systematic way of identifying and classifying world-class universities. However, in the last century, international rankings were of interest only to education specialists. The arrival of global university rankings, generally seen to start in 2003, has changed the global landscape of higher education and is likely to continue to influence development nationally and internationally. In fact, ranking systems have become a standard feature in higher education systems. They are also increasingly accepted as an instrument to inform and guide evaluation and planning decisions at a global, national, institutional and individual level.

Rankings serve as a particularly useful lens for the study of power in higher education, as they are used to confer prestige, in the allocation of resources, as a form of agenda setting, as a means of stratifying national higher education systems, as a means of establishing hierarchical relations between nations, and as a lever to impose demands for accountability<sup>5</sup>.

However, no ranking system can present the full picture of Higher Education Institutions (HEIs) in their entirety, but they are an important comparator. They impact stakeholders across the full university system: from students, faculty, researchers and research office to national governments and funding bodies.

- **1998**
  - Centre for Higher Education in Germany developed its own national ranking, CHE-Hochschul-Ranking (CHE University Ranking)
- **2003**
  - The arrival of global rankings with Academic Ranking of World Universities (ARWU), the first international ranking
- **2004**
  - Times Higher Education
  - QS World University Rankings
  - Webometrics (Spanish National Research Council), Spain
- **2006**
  - CWTS Leiden Ranking
- **2007**
  - National Taiwan University Ranking, Taiwan
- **2009**
  - SCImago Journal
  - Country Rank (SJR), Spain and University Ranking by Academic Performance (URAP) (Informatics Institute of Middle East Technical University), Turkey
- **2010**
  - The Times Higher Education World University Rankings (THE), UK
  - QS World University Rankings (Quacquarelli Symonds), UK
- **2014**
  - U-Multirank World University Rankings (European Commission), Belgium
  - US News Best Global Universities Rankings

<sup>4</sup> Salmi J. (2016) Excellence Strategies and the Creation of World-Class Universities. In: Liu N.C., Cheng Y., Wang Q. (eds) Matching Visibility and Performance. Global Perspectives on Higher Education. SensePublishers, Rotterdam. [https://doi.org/10.1007/978-94-6300-773-3\\_2](https://doi.org/10.1007/978-94-6300-773-3_2).

<sup>5</sup> Pusser, Brian & Marginson, Simon. (2013). University Rankings in Critical Perspective. The Journal of Higher Education. 84. 544-568. <https://doi.org/10.1353/jhe.2013.0022>

# Impact

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**Since the millennium, university rankings have become increasingly influential. Key stakeholders use rankings to influence important decisions, including:**



## **Universities & leadership**

University leadership can see the impact directly in the form of quality and number of students enrolled, which in turn affect their budget



## **Student and parents**

Reputation derived from league tables is a critical determinant for student applicants, especially for international students



## **Employers**

Employers often seek out and prioritize candidates from the most highly respected universities



## **Governments & funding agencies**

Governments and funding agencies are more favourably disposed to highly ranked universities



## **Collaborators & partners**

Organizations and institutions use rankings as a benchmark when seeking out collaboration partners

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Rankings are also used as a 'policy instrument' to underpin and quicken the pace of higher education reform.

**"Whatever one's own views,  
it is impossible to ignore them"**

**Ellen Hazelkorn, Director of Higher Education Policy Research Unit (HEPRU), Dublin Institute of Technology (Ireland)**

# Understanding the rankings






University rankings are based on a range of different factors, and different ranking systems use different indicators and different weights.

■ Research related indicators ■ Patent related indicators ■ Other indicators

Number of publications in indexed journals	Staff-to-student ratio	Citations per faculty	Number of published books
Industry article citation impact	Number of conference proceedings	Avg. number of times a journal has been cited by patents	University income
Doctorate to Bachelor students ratio	Number of Highly Cited Researchers™	Number of publications cited in Science / Nature	Number / percentage of publications with international co-authors
Number / ratio of 1% most cited publications	Number of basic patents filed by the organization	Proportion of international students	Number of citations
Percentage of articles that contain one or more industrial co-authors	Citations per faculty	Number / percentage of 10% most cited publications	Student reputation among companies
Percentage of patents cited	Proportion of international staff	Reputation among colleagues / students	Average number of citations
Reputation among research peers (regional / international)	Quantity and quality of research grants	Research income from industry	Percentage of academic staff possessing a doctorate degree
Staff / alumni with Nobel prizes or the Fields medal	Ratio of patent applications to grants over the assessed timeframe	Percentage of patents sought with the U.S., European and Japanese patent offices	Total number of times a patent has been cited by other patents

## The major players

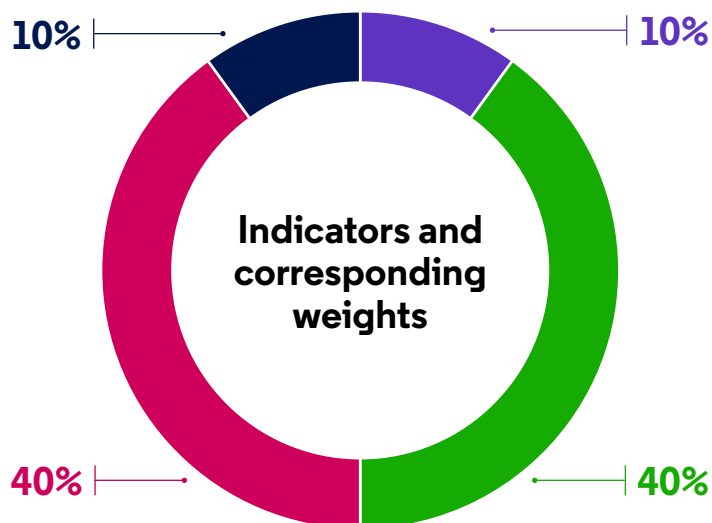
Several organizations produce worldwide university rankings, including:

				
<b>Academic Ranking of World Universities</b>	<b>CWTS Leiden Ranking</b>	<b>QS World University Rankings</b>	<b>THE World University Rankings</b>	<b>U.S. News Best Global University Ranking</b>
Publisher: Shanghai Ranking Consultancy	Publisher: Centre for Science and Technology Studies Leiden University	Publisher: QS Quacquarelli Symonds	Publisher: Times Higher Education	Publisher: U.S. News & World
Since: 2003	Since: 2008	Since: 2004	Since: 2004	Since: 2014

The following pages provide some key information on each of these ranking systems, including key indicators and weightings, criteria for inclusion and data sources.

# Academic Ranking of World Universities

- Quality of education**
  - Alumni of an institution winning Nobel prizes and Fields medals (10%)
- Quality of faculty**
  - Staff of an institution winning Nobel prizes and Fields medals (20%)
  - Highly Cited Researchers (20%)
- Research output**
  - Papers published in Nature and Science\* (20%)
  - Papers indexed in Social Science Index Expanded™ and Social Sciences Citation Index™ (20%)
- Per capita performance<sup>6</sup>**
  - Per capita performance of an institution (10%)



## Criteria for inclusion

### 01

ARWU considers every university that has any Nobel Laureates, Fields Medalists, Highly Cited Researchers, or papers published in Nature or Science

### 02

Universities with a significant amount of papers indexed by Science Citation Index-Expanded (SCIE) and Social Science Citation Index (SSCI) are also included

### 03

In total, more than 1800 universities are ranked and the best 1000 are published

## Data sources

Nobel prize	<a href="http://www.nobelprize.org">www.nobelprize.org</a>
Fields medals	<a href="http://www.mathunion.org/imu-awards/fields-medal">www.mathunion.org/imu-awards/fields-medal</a>
Cited researchers	<a href="http://www.clarivate.com/webofsciencegroup/solutions/web-of-science">www.clarivate.com/webofsciencegroup/solutions/web-of-science</a>
Nature & Science papers	<a href="http://www.clarivate.com/webofsciencegroup/solutions/web-of-science">www.clarivate.com/webofsciencegroup/solutions/web-of-science</a>
Published indexed papers	<a href="http://www.clarivate.com/webofsciencegroup/solutions/web-of-science">www.clarivate.com/webofsciencegroup/solutions/web-of-science</a>
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.

<sup>6</sup>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 are used. For ARWU 2019, the numbers of full-time equivalent academic staff were obtained for institutions in USA, UK, France, Canada, Japan, Italy, China, Australia, Netherlands, Sweden, Switzerland, Belgium, South Korea, Czech, Slovenia, New Zealand etc.

# CWTS Leiden Rankings

## Indicators and corresponding weights

### ■ Scientific impact indicators

- Total number of publications of a university.
- The number and the proportion of a university's publications that, compared with other publications in the same field and in the same year, belong to the top 1% most frequently cited.
- The number and the proportion of a university's publications that, compared with other publications in the same field and in the same year, belong to the top 5% most frequently cited
- The number and the proportion of a university's publications that, compared with other publications in the same field and in the same year, belong to the top 10% most frequently cited
- The number and the proportion of a university's publications that, compared with other publications in the same field and in the same year, belong to the top 50% most frequently cited
- The total and the average number of citations of the publications of a university
- The total and the average number of citations of the publications of a university, normalized for field and publication year

### ■ Collaboration indicators

- Total number of publications of a university.
- The number and the proportion of a university's publications that have been co-authored with one or more other organizations
- The number and the proportion of a university's publications that have been co-authored by two or more countries
- The number and the proportion of a university's publications that have been co-authored with one or more industrial organizations
- The number and the proportion of a university's publications with a geographical collaboration distance of less than 100 km.
- The number and the proportion of a university's publications with a geographical collaboration distance of more than 5000 km

### ■ Open access indicators

- Total number of publications of a university
- The number and the proportion of open access publications of a university
- The number and the proportion of gold open access publications of a university
- The number and the proportion of hybrid open access publications of a university
- The number and the proportion of bronze open access publications of a university
- The number and the proportion of green open access publications of a university
- The number and the proportion of a university's publications for which the open access status is unknown

### ■ Gender indicators

- The total number of authorships of a university
- The number of male and female authorships of a university, that is, a university's number of authorships for which the gender is known
- The number of authorships of a university for which the gender is unknown and the number of authorships for which the gender is unknown as a proportion of a university's total number of authorships
- The number of male authorships of a university, the number of male authorships as a proportion of a university's total number of authorships, and the number of male authorships as a proportion of a university's number of male and female authorships
- The number of female authorships of a university, the number of female authorships as a proportion of a university's total number of authorships, and the number of female authorships as a proportion of a university's number of male and female authorships

## Criteria for inclusion

### 01

At least 800 publications indexed in the Web of Science in the period 2015–2018

### 02

CWTS identifies a 'core' journal list of international scientific journals

### 03

Only research articles and review articles are taken into account.

## Data sources

Scientific impact indicators<sup>7</sup>

Collaboration indicators<sup>7</sup>

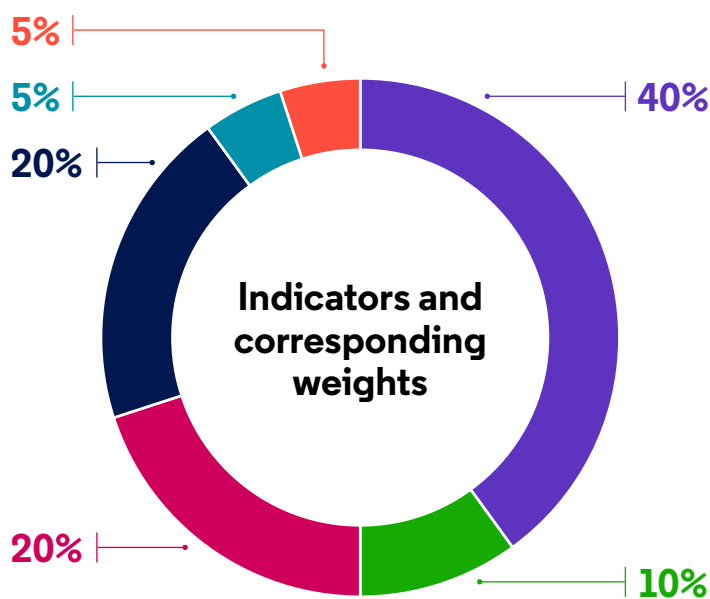
Open access indicators<sup>7</sup>

Gender indicators<sup>7</sup>

<sup>7</sup> Clarivate's Science Citation Index Expanded, the Social Sciences Citation Index, and the Arts & Humanities Citation Index™. For each author, gender statistics are collected from three sources: Gender API, Genderize.io, and Gender Guesser.

# QS World University Rankings

- **Academic reputation**
  - Expert opinions of more than 94,000 individuals in the higher education space regarding teaching and research quality at the world's universities (40%)
- **Employer reputation**
  - Employers' opinions identifying those institutions from which they source the most competent, innovative, effective graduates (10%)
- **Faculty/student Ratio**
  - Self explanatory (20%)
- **Citations per faculty**
  - 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 (20%)
- **International faculty ratio**
  - Self explanatory (5%)
- **International student ratio**
  - Self explanatory (5%)



## Criteria for inclusion

### 01

A university must teach at multiple study levels (i.e. both undergraduate and postgraduate)

### 02

Conduct work in at least two of five possible faculty areas (Arts and Humanities; Engineering and Technology; Social Sciences and management; Natural Sciences; Life Sciences and Medicine)

## Data sources

Academic reputation	QS Academic Survey
Employer reputation	QS Employer Survey
Faculty/student ratio	University
Citations per faculty	Elsevier's Scopus database
International faculty ratio	University
International student ratio	University



# THE World University Rankings

## Teaching

- Reputation (15%)
- Staff-to-student ratio (4.5%)
- Doctorate to Bachelor ratio (2.25%)
- Doctorates awarded to academic Staff (6%)
- Institutional income (2.25%)

## Research

- Reputation (18%)
- Research income (6%)
- Research productivity (6%)

## Citations

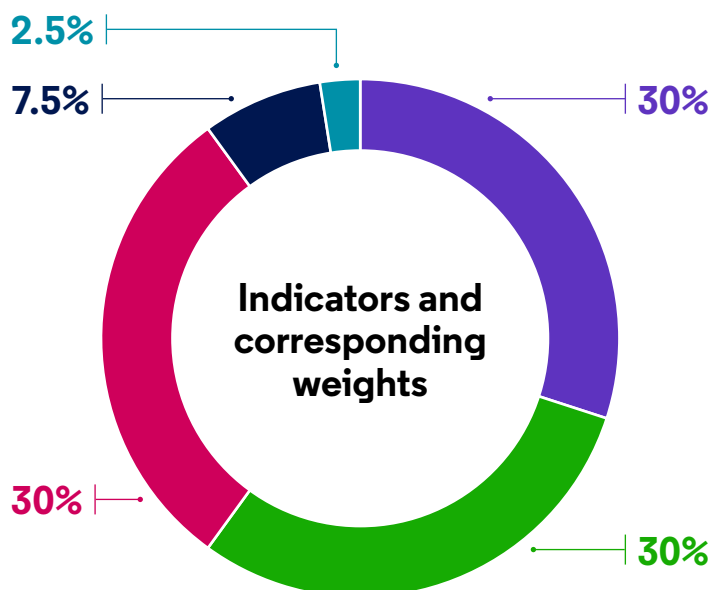
- Average number of times a university's published work is cited (30%)

## International outlook

- Proportion of international students (2.5%)
- Proportion of international staff (2.5%)
- International collaboration (2.5%)

## Industry Income

- Research income an institution earns from industry scaled to the number of academic staff (2.5%)



## Criteria for inclusion

### 01

Universities that teach undergraduates

### 02

Universities with research output amounting to more than 1,000 relevant publications between 2014 and 2018 (with a minimum of 150 a year)

### 03

80 percent or more of their research output is not exclusively in one of THE 11 subject areas

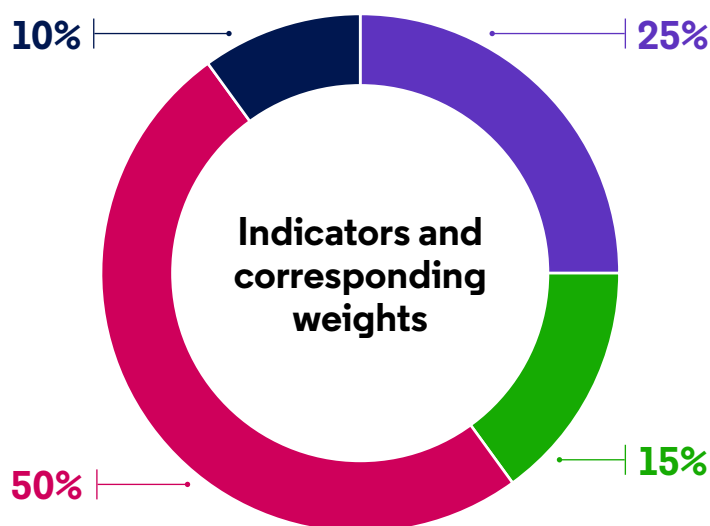
## Data sources

Teaching	THE Academic Reputation Survey Provided by university <sup>6</sup>
Research	THE Academic Reputation Survey Provided by university <sup>6</sup> Scopus, Elsevier
Citations	Scopus, Elsevier
International Outlook	Provided by university <sup>8</sup> Scopus, Elsevier
Industry Income	THE Academic Reputation Survey

<sup>8</sup> 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, THE enters a conservative estimate for the affected metric

# U.S. News & World Report Best Global Universities Rankings

- Reputation**
  - Global research reputation (12.5%)
  - Regional research reputation (12.5%)
- Productivity**
  - Publications (10%)
  - Books (2.5%)
  - Conference proceedings (2.5%)
- Impact**
  - Normalized citation impact (10%)
  - Total citations (7.5%)
  - Number of publications that are among the 10% most cited (12.5%)
  - Percentage of total publications that are among the 10% most cited (10%)
  - Number of highly cited papers that are among the top 1% most cited in their respective field (5%)
  - Percentage of total publications that are among the top 1% most highly cited papers (5%)
- International outlook**
  - International collaboration – relative to country (5%)
  - International collaboration (5%)



## Criteria for Inclusion

### 01

Top 250 universities in the results of the Clarivate global reputation survey

### 02

OR at least 1,500 papers published in 2014 to 2018

### 03

Only include universities/institutions that teach

## Data Sources

Reputation	<a href="http://www.clarivate.com/webofsciencegroup/globalprofilesproject">www.clarivate.com/webofsciencegroup/globalprofilesproject</a>
Productivity	Web of Science platform, Clarivate
Impact	Web of Science platform, Clarivate
International Outlook	Web of Science platform, Clarivate

# Achieving university excellence

## How can I influence my university's excellence?



### If you are a researcher

- Conduct excellent research
- Publish research results in impactful journals
- Participate in academic conferences
- Membership of international journal editorial board and academic organizations
- Win international awards
- Emphasize real-world impact of research output



### If you are a university leader

- Understand the current research performance and diagnose the underlying issues
- Employ a strategic design of the research system, allocation of resources and appropriate policies
- Continuously measure performance and ensure policies and processes are followed
- Encourage cutting-edge research
- Identify, recruit and nurture the most talented global researchers
- Improve your global reputation and standing
- Develop international collaborations and partnerships
- Focus university's socio-economic impact

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***"The establishment of a world-class university requires, above all, a strong leadership, a bold vision of the institution's mission and goals, and a clearly articulated strategic plan to translate the vision into concrete programs and targets...A crucial element of the vision is the discovery of a niche market toward which the institutions will seek to build and maximize its comparative advantage."***

**Jamil Salmi**

**The Challenge of Establishing World-Class Universities**



## About Clarivate

Clarivate™ is a global leader in providing solutions to accelerate the lifecycle of innovation. Our bold mission is to help customers solve some of the world's most complex problems by providing actionable information and insights that reduce the time from new ideas to life-changing inventions in the areas of science and intellectual property. We help customers discover, protect and commercialize their inventions using our trusted subscription and technology-based solutions coupled with deep domain expertise. For more information, please visit [clarivate.com](https://clarivate.com).

## How can we help you with your ranking strategy?

Clarivate helps HEIs drive research performance improvements that make a real impact on university rankings. Combining deep understanding of the different ranking systems with our world-class tools and data sets, we work with universities to benchmark existing performance, review research goals and develop a strategic plan to improve research performance and academic rankings.

Contact our experts today:

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