



Higher Education Rankings: Brazilian Federal Universities

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Abstract. The rankings of higher education institutions are consolidating themselves as one of the means of measuring a university's credibility worldwide. This growing visibility makes it essential to research how the 69 Brazilian federal universities participate in the main Rankings of Higher Education. A literature review identified the main rankings, their home institution, their objectives, the dimensions evaluated, and the number of federal universities participating in each ranking. The rankings that have the most significant number of participating federal universities are the "Web and SIR," with respectively 61 (88%) and 57 (83%) federal universities, and the one with the lowest participation in the "UI Green Metric" with 16 (23%). Each federal university, considering its competencies, must select which ranking it should participate in and use it for the development and implementation of strategic internationalization actions. The university can develop mobility, research, and strategic agreements.

Keywords: University ranking, Higher Education, Federal Universities.

1 Introduction

University ranking systems are typically limited to the national context. Economic expansion, the evolution of digital means, added to the evolution of means of transport, moved away from each nation's restricted and specific approach to offer academic classifications of an international character [5]. Thus, a global environment demands global universities. Not all universities want to be global, but comparing themselves with international universities, considering their context, allows the superior councils of universities to establish strategic actions. Bauder [3] already said that the construction of "world-class universities", is the preponderant possessor of internationalization.

Organizations value human capital, especially those that add value through work, skill, and knowledge, to add value to their products and processes [15]. This organization also applies to social, social, and cultural factors. Several surveys have been carried out on international university rankings with critical emphasis. The problem with



ranking concerns the practice, not the principle. There are, in fact, no widely accepted methods for measuring teaching quality, and assessing the impact of education on students is so far from an unexplored area as well [2]. Nevertheless, several surveys have been developed over the years [8; 15; 7] and the visibility and importance of university rankings.

The university's international recognition is relevant, even for the student who believes that enrolling in prestigious universities has the potential to improve social status and employment prospects.

This research aims to identify how Brazilian federal universities participate in the main Rankings of Higher Education.

This diagnosis is part of an initial study by the Secretariat of Higher Education of the Ministry of Education of Brazil, whose theme is world-class universities.

There are courses in 69 universities throughout the Brazilian territory that support 6,464 training courses; offered in 501 municipalities; offered about 280,000 vacancies in the unit; there are 1,323 doctoral courses; and 2,400 master's courses. There are 1,114,494 undergraduates, 130,311 masters and 80,708 doctoral students enrolled. There are 94,541 professors and 101,832 administrative technicians. The 2022 budget is on the order of US\$ 74 billion (Fonte: Plataforma Universidade 360⁰).

Federal universities' academic data, people, budget, and general management indicators are publicly communicated for a free consultation in the "Plataforma Universidade 360⁰" (Fig.1).



Fig. 1. 360^o University Platform - Higher Education Observatory.

University ranking systems are numerous, as it depends a lot on the type of indicator selected and how that indicator is collected. Thus, the main public rankings, called league tables, use indicators such as scientific production in fundamental quantities and qualities based on scientific articles; and intellectual property through searches for resources and resource opinions [16].

Rankings allow universities to be evaluated based on objective criteria, enhancing improving university products, services, and processes in a context of interinstitutional competition [6].



2 World-Class Universities and Rankings of Higher Education

The concept of World-Class Universities has become a standard for higher education institutions (HEIs) to compete internationally in the higher education market [1]. Therefore, the focus on obtaining "financial income" is relevant in this definition.

World-Class Universities are characterized by a high concentration of talent (professors and students); abundant resources to provide a rich learning environment and conduct advanced research; favorable governance characteristics that encourage strategic vision, innovation, and flexibility, allowing institutions to make decisions and manage resources without being burdened with bureaucracy [14].

In addition to the significant differences in university educational management models between Brazil and other countries in the world, the objectives of the rankings become different for each country. However, there is a need for comparison between nations [10]. Even how to demonstrate the economic and intellectual growth of the nation [11]. In this way, the dispute between institutions and nations arises to contain World-Class Universities, featuring an elite of institutions based on international recognition because of superior performance in the rankings. This allows comparative assessments at an international level [4].

Therefore, rankings are used with a view of accountability and transparency within the search for excellence, which generates several implications for higher education in internationalization and competition, governance and autonomy, and quality and productivity [9].

This regulation began to be inserted in the national context in 1995 when public policies to regulate higher education were created to rank higher education institutions, using national exams with graduates of higher education courses, changing format and acronyms until reaching the Preliminary Concept of Courses (CPC) and the General Course Index (IGC), contributing as ranking mechanisms in the country [6].

Furthermore, in Brazil, a large part of the scientific community is located within public universities and research institutes, which makes it essential to analyze the performance of these institutions since research is one of the main drivers of scientific and economic development in many countries [17].

In this context, it is common for universities to incorporate the results of the rankings for changes in their management models: planning, formulation, and implementation of strategies to improve institutional performance [12]. In addition, there is the promotion of competitiveness between the HEIs, improving performance, which generates excellent returns to society by stimulating unprecedented research and the production of technology [13]. Justifies the government's influence on education policies, as well as on ranking systems.

The main advantage of the rankings is to standardize information from different economic, social, and cultural contexts, allowing support for the decision-making process at governmental and even individual levels, enhancing fundraising (financing, attracting students, good researchers, and professors [12]. The simplicity of the rankings encourages students, professionals, and governments to use rankings in the decision-making process, whether to enter as a student or professional (teacher and/or

researcher), or in the process of embracing resources and investments, as well as public policies for these Higher Education Institutions [19].

The main world university rankings used by Higher Education Institutions (HEIs) were determined by a bibliographic search on the Capes journal portal – Portal CAFé, comprising the search period between the years 2016 to 2021, using as a search: "world university rankings", in the Scopus database. A total of 182 documents were found, including articles and a conference paper. The ten most-cited rankings in the bibliographic research were listed (Table 1).

Table 1. Rankings most cited in the Scopus database, 2016-2021.

Rankings	Number of citations	
	Absolute	%
QS - Quacquarelli Symonds	115	63%
THES - Times Higher Education Supplement - World University Rankings	85	47%
ARWU – Annual Ranking World University	55	30%
UI Greem Metric	22	12%
U-Multirank	12	7%
US News	10	5%
Web ou Webometrics	9	5%
CWTS - Leiden Ranking	9	5%
SIR - SCImago Institutions Ranking	6	3%
CWUR - Center for World University Rankings	4	2%
Total	182	

The rankings attract media attention and considering our objective, all the most cited rankings will be detailed.

Table 2 briefly describes university rankings, home institutions, and their objectives.

Table 2. Main university rankings, home institutions and their objectives

Rankings	Home institution	Objective
QS	Quacquarelli Symonds, England	Encourage students to make comparisons between universities that are options for international studies. Includes rankings by continents (Latin America, Asia, Europe...)
THES	Times Higher Education, England	Evaluate the performance of the best universities using the database citation data provided by Thomson Reuters, evaluating the performance of the best universities in the areas of teaching, research, extension, and internationalization. It seeks to serve various users: students, academics, university leaders, market and government.
ARWU	Jiao University	Know the position of Chinese universities compared to

Rankings	Home institution	Objective
	Shanghai Tong, China	world-renowned universities to identify prestigious ones internationally and establish partnerships. It focuses on the academic and research performance of universities.
UI Greem	University of Indonesia	Demonstrate the sustainability and environmental management efforts of higher education institutions worldwide.
U-Multirank	European Commission independent led by the Center for Higher Education (CHE) in Germany	Compare institutions with similar institutional profiles ("like-with-like") and allows users to develop their custom rankings, selecting indicators in terms of their preferences
US News	US News	Serve as an objective guide by which students and their parents can compare their academic quality. US News & World Report was one of the pioneers in publishing college and university rankings, and its America's Best Colleges ranking is the oldest college ranking currently published.
Web or Webometrics	Laboratory Cybermetrics - Spanish National Research Council	Promote academic visibility on the web, supporting open access initiatives to significantly increase the transfer of scientific and cultural knowledge generated by universities to society and provide helpful information in real-time to university website managers, who are identified as users of that information.
CWTS	Center for Science and Technology Studies, Leiden University - Netherlands	Assess the quality of research carried out by European institutions.
SIR	SCImago Lab, Spain	Evaluate data retrieved from the Scopus-Elsevier database on all research organizations, not just universities.
CWUR	Center for World University Rankings, United Arab Emirates	Assesses the quality of student education and training, faculty members' prestige, and the quality of their research without relying on university surveys and data submissions.

The participation of federal universities in university rankings is directly related to the indicators (Tables 3 and 4) used by the rankings for the classifications.

The U-Multirank ranking does not show weights for its performance indicators since it uses a scale from very good to weak, and it is impossible to quantify the indicators' percentages. On the other hand, the CWTS ranking (Leiden Ranking) presents a methodology based on proportions of indicators with normalized data, and it is impossible to quantify the indicators' weight.

Table 3. Dimensions of results considered by the most cited rankings in the Scopus database, period 2016 -2021

Dimensions	Ranking							
	Webometrics	SIR	CWUR	THE	US News	QS	ARWU	UI Green Metric
Academic reputation (opinion survey)				33%		40%		
Employer reputation (opinion survey)						10%		
Global and regional research reputation				25%				
Visibility (Impact of web content)	50%	20%						
Education and Research								18%
Quality of education (Official websites of awards)			25%					
Alumni and employees who received the award							30%	
Nobel or Fields Medal 30% Positions in companies held by (Forbes Global alumni 2,000 list)			25%					
Institutional income				2,25 %				
Industry income				2,5 %				
Search income				6%				
Citation faculty		10%		30%	7,5 %	20%	40%	
Quality of the teaching staff (Official websites of the awards)			10%					
Transparency (most cited researchers)	10%							
Innovative knowledge		10%						
Patents		10%						
Technological impact		10%						
Search result			10%					
Citation impact		13%	10%		10%			
Number of publications that are in the top 10% most cited					12,5 %			
Percentage of total publications that are among the 10% most cited			10%		10%			
Excellence (most cited articles)	40%	2%						
International collaboration		2%			10%			
Excellence with Leadership		8%						8%
Exit		8%						8%
Scientific Leadership		5%						5%
It does not have its own periodicals and magazines		6%						
Open access		2%						
Scientific talents		2%						

Dimensions	Ranking							UI Green Metric
	Webometrics	SIR	CWUR	THE	US News	QS	ARWU	
Publications, books, conferences					15%			
High quality publications	2%							
Number of highly cited articles that are in the top 1% of their respective fields					5%			
Articles published in Nature or Science							20%	
Research productivity				6%				
Per capita performance							10%	
Energy and Climate change								21%
Waste								18%
Water								10%
Transport								18%
Total	100%	100%	100%	79,7%	100%	70%	100%	85%

Table 4. Dimensions of means considered by the most cited rankings in the Scopus database, period 2016 -2021

Dimensions	Ranking							UI Green Metric
	Webometrics	SIR	CWUR	THE	US News	QS	ARWU	
Staff per student ratio				4,5%				
Proportion of students and teachers						20%		
Ratio of doctorate to bachelor's degree				2,25%				
Doctorate/team ratio academic				6%				
Proportion of international students				2,5%		5%		
International staff proportion				2,5%				
Proportion of international professors						5%		
International collaboration				2,5%				
Environment and infrastructure								15%
Total	0%	0%	0%	20,2%	5%	0%	30%	0%

The analyzed rankings focus on the results, and only a few consider the means.

3 Participation of Brazilian universities in the ranking of higher education

The reputation of a university has been built over several years, and in this aspect, many Brazilian universities are still working on building their image, as they are very new compared to international universities well positioned in the rankings.

The participation of HEIs in Brazil in the most cited rankings in the Scopus database is summarized in Table 5, highlighting the region's participation in absolute and relative numbers.

The analysis of Table 5 identifies that of the 69 federal universities, the ranking with the highest participation is Web and SIR. These results do not mean that federal universities do not participate but that they may not have obtained scores that qualify them.

Rankings count external funding, numbers of articles and books written by faculty members, library resources, the proportion of faculty members with advanced degrees, and quality of students (measured by scores on admissions or other tests).

Institutions in the biomedical sciences usually have more external grant or contract funds than those with strength in the humanities or social sciences. Rankings generally do not include teaching quality.

Table 5. Universities by region and participation in the most cited rankings in the Scopus database, period 2016-2021

Geographic regions of Brazil	South	Southeast	Midwest	Northeast	North	Total						
Total Federal Universities	11	19	8	20	11	69						
Rankings	Abs.	%	Abs.	%	Abs.	%	Abs.	%	Abs.	%	Abs.	%
Web	11	100	19	100	5	63	17	85	9	82	61	88
SIR	10	91	19	100	5	63	14	70	9	82	57	83
THE	7	64	15	79	5	63	11	55	2	18	40	58
CWUR	7	64	15	79	4	50	11	55	2	18	39	57
US News	7	64	15	79	3	38	8	40	1	9	34	49
CWTS	5	46	11	58	3	38	5	25	1	9	25	36
QS	6	55	11	58	3	38	4	20	0	0	24	35
U-Multirank	5	46	10	53	3	38	5	25	1	9	24	35
ARWU	5	46	7	37	3	38	4	20	1	9	20	29
UI Greem Metric	5	27	9	47	1	13	2	10	1	9	16	23



Initially, participation in International Academic Rankings enhances potential evolutionary results for federal universities:

- Establish mobility agreements: consists of the mobility of students and faculty, which contribute to the construction of a global brand. They usually occur through agreements and projects between Brazilian universities and other international universities.
- Research agreements: are typically limited to project lifecycles and funding regimes. The researcher is the critical “link.” These collaborations are usually results-oriented. Universities have the potential for digital exposure to communicate the narratives of these researches (Webinars).
- Strategic agreements: focuses on adding strategic value to the “brand” of partner universities. It consists of an agreed plan of collaboration, interaction, and participation. Strategic partners are outnumbered and focused on long-term solutions and short-term joint engagement.

The analyzed rankings focus on the results, and only a few consider the means.

4 Conclusions

Universities must select the ranking they wish to participate. The choice should consider size, history, context, mission, objectives, and value proposition.

The rankings help federal universities identify "what they do well", their core competencies. In addition, the rankings help universities develop their Institutional Development Plan in terms of internationalization.

The use of rankings tends to grow as they allow the establishment of global references.

Opportunities for future research may be the use of rankings to guide public policies of internationalization through the allocation of resources. A more detailed analysis can establish clusters through the rankings of federal universities, thus guiding internationalization actions.

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