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The Brazilian *Ranking* of Research and the Berlin principles for *Rankings* of Institutions of Higher Education

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ABSTRACT

University rankings are gaining prominence as assessment tools of higher education institutions. In recent years there have emerged various rankings, either with national or international focus. The CWTS Brazilian Research Ranking (BRR) was launched in 2014 in Brazil and measures the performance of Brazilian scientific research institutions (not just universities). Using a sophisticated set of bibliometric indicators, this ranking aims to provide highly accurate measurements of the scientific impact of these organizations and their involvement in scientific collaboration, and its data source is the Web of Science database, considering indexed publications between 2003 and 2012. The aim of this paper is an analysis and a discussion if the BRR follows the recommendations from the document "Berlin Principles for Higher Education Institutions Rankings", published in 2006 by the International Rankings Expert Group, which contains a set of sixteen guidelines to guide producers in developing their rankings. The comparison of the BRR with the Berlin principles showed that this ranking is close to complete its accordance with the recommendations for rankings.

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KEY-WORDS: Rankings. Brazilian Research Ranking. Guidelines. Berlin Principles for Rankings of Higher Education Institutions.

O *Ranking* Brasileiro de Pesquisa e os Princípios de Berlim Para *Rankings* de Instituições de Ensino Superior

RESUMO

Os *rankings* estão ganhando destaque como instrumentos de avaliação das instituições de ensino superior. Nos últimos anos, surgiram vários deles, tanto nacionais quanto internacionais. O *Ranking* Brasileiro de Pesquisa (BRR) foi lançado em 2014 no Brasil e mede o desempenho das instituições de pesquisa científica brasileiras. Usando um sofisticado conjunto de indicadores bibliométricos, o *ranking* tem como objetivo fornecer medições altamente precisas do impacto científico dessas organizações e de seu envolvimento na colaboração científica. Sua fonte de dados é a base *Web of Science*, considerando publicações indexadas no período entre 2003 e 2012. No presente artigo, é analisado se o BRR segue as recomendações do documento "Princípios de Berlim para *Rankings* de Instituições de Ensino Superior", elaborado em 2006 pelo Grupo Internacional de Especialistas em *Rankings*, que contém um conjunto de 16 diretrizes para orientar os produtores de *rankings* na elaboração de suas classificações. O cotejo das características do BRR com os Princípios de Berlim mostrou que esse *ranking* está perto de completar sua conformidade aos princípios recomendados para *rankings*.

PALAVRAS-CHAVE: *Rankings*. *Ranking* Brasileiro de Pesquisa. Diretrizes. Princípios de Berlim para *Rankings* de Instituições de Ensino Superior.

1 INTRODUCTION

Higher Education currently experiences a process of massification, commercialization and Globalization (Shin, Toutkoushian & Teichler, 2011). In fact, a recent report published by the *Organização das Nações Unidas para a Educação, a Ciência e a Cultura-– United Nations Educational, Scientific and Cultural Organization* – (Unesco, 2015) indicates the trends and developments in science, technology, innovation policy and governance in the period between 2009 and mid-2015, showing a continuous growth of higher education in the world: the number of international students has increased from 2.8 million to 4.1 million between 2005 and 2013. According to the report, from 2012 five countries had more than 10,000 of their PhD students abroad: China (58,492 students), India (30,291), Germany (13,606), Iran (12,180) and The Republic of Korea (11,925). Ten others had more than 4,000 (Italy, Canada, The USA, Saudi Arabia, Indonesia, France, Vietnam, Turkey, Pakistan and Brazil), projecting a strong impulse in the globalization of higher education worldwide. In Figure 1, it is shown that this trend of growth of Higher Education internationalization has been continuous since 1975.

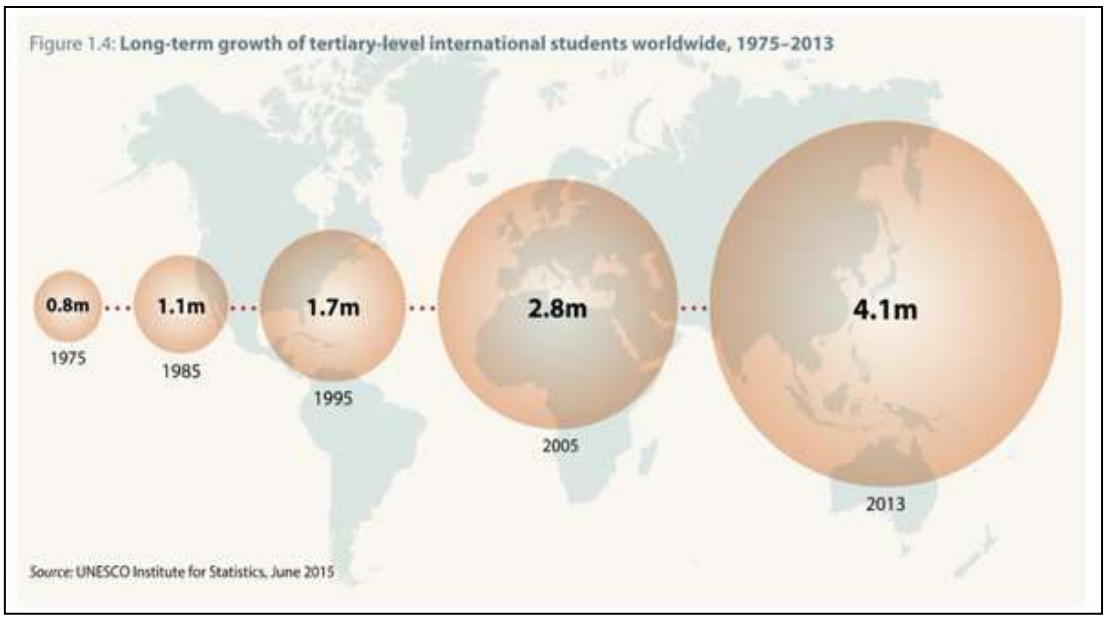

Figure 1: World growth over the long term of international students from the higher education level (1975-2013)

Source: Unesco (2015)

In this scenario, the University *rankings* gain prominence as instruments of assessment and classification of universities, especially after the launch, in 2003, of the first worldwide *ranking*, the *Academic Ranking of World Universities* (ARWU), also known as Shangai *Ranking*, launched by the Shanghai Jiao Tong University, from China. As a result, there were other world *rankings*, such as *Times Higher Education World University Rankings* (THE) and the *Webometrics Rankings* (WR), both of them launched in 2004; CWTS *Leiden Ranking* in 2007; SCImago *Institutions Rankings World Report* (SIR) in 2009; and the *Quacquarelli Symonds World University Rankings* (QS) in 2010, among others. These systems gain increasing importance in the current society, as an indicative of a paradigm of excellence and quality of higher education institutions (HEIS) in the globalized world.

However, *rankings* of universities already existed before the current global versions. The first university worldwide *ranking* , the *America's Best Colleges*, was published in the United States in 1983 by the weekly journal *U.S. News & World Report* (Webster, 2001), also followed by others with national scope, created with the primary goal of guiding students in choosing the university for the continuation of their studies after the exam *Scholastic Aptitude Test* or *Scholastic Assessment Test* (SAT) – an instrument of admission to higher education in the United States which allows the student to choose among several options of universities, simultaneously (Almeida Filho, 2011).

The American experience inspired the creation of national systems of classification of universities in other countries. Usher and Medow (2009) analyzed 22 national *rankings* in 15 different countries (Australia, Canada, Kazakhstan, Chile, China, Spain, The United States, The Netherlands, Hong Kong, Italy, Peru, Poland, the United Kingdom, Taiwan and Ukraine), pointing their proliferation. Brazil already has two university *rankings* in national level: The *Ranking* Universitário da Folha (RUF, 2015), launched by the newspaper *Folha de S.Paulo* in 2012 and now in its fifth edition; and the *Ranking* Brasileiro de Pesquisa (CWTS *Brazilian Research Ranking* – BRR (2015), launched in May 2014 and produced by the *Centro para Estudos de Ciência e Tecnologia de Leiden* (*Centre for Science and Technology*

Studies, or *Centrum voor Wetenschap en Technologische Studies* – CWTS), Dutch institution dedicated to the study and metrics of Science and Technology (S&T), linked to the University of Leiden.

Such expansion of National *rankings* can be interpreted as a reaction to the overall standings by countries whose HEI in them are disregarded, or even to complement national aspects and sites that are not listed among the criteria of these international listings.

With the growing importance of the phenomenon of the *rankings*, showing its influence on individual decisions when it comes to opt for a university, the reputation of the ranked institutions and in policies aimed at higher education - not without controversy triggered on the methodologies adopted by different classifications -, comes the understanding that such devices must be followed up, ensuring due attention to ethical procedures. Thus, the *Organização das Nações Unidas para a Educação, a Ciência e a Cultura* (*United Nations Educational, Scientific and Cultural Organization* – Unesco), in partnership with international bodies for education, establishes in 2004 the *Grupo Internacional de Especialistas em Rankings* (*International Ranking Expert Group* – IREG), which in 2006 drew up the document "Berlin Principles for *Rankings* of Institutions of Higher Education", a set of 16 recommended principles to guide the producers of *rankings* on quality and best practices in the preparation of their classifications of HEI. In this work, it is analyzed the Brazilian Research (BRR) Ranking, with the objective of verifying their compliance with the Berlin principles.

2 METHODOLOGY

To achieve the proposed objective, there is a brief explanation of the criteria considered by the *rankings* to classify universities. As it follows, the BRR characteristics are described, as well as the guidelines of the Berlin principles for *rankings* of Higher Education Institutions. The 16 guidelines of the document are then compared with available information from the BRR, accompanied by analysis and discussion, assigning a score of conformity to each of the Berlin principles, through an adaptation of the

Likert Scale (Badri, Donald & Donna, 1995), with five *scores* ranging from "Not applicable" (NA), meaning that the Berlin principle in question is not applicable to the BRR, not constituting score; "Does Not Meet", in that the BRR does not comply with the requirement of the principle, with a value of 0%; "Meets partially", meaning that there is some adherence of the BRR to the principle related, drawing 50%; "Meets", in which the requirement of the principle is met by the BRR, 75%; and "meets totally", when the requirement of the principle is met and exceeded, with a value of 100%. Finally, the results are consolidated for checking the level of compliance of the BRR to the Berlin principles for *Rankings* of Institutions of Higher Education.

3 THE CRITERIA CONSIDERED BY THE *RANKINGS* OF UNIVERSITIES

According to Shin (2011), the criteria considered by the *rankings* of universities are related to dimensions of institutional effectiveness represented in some measures of indicators of *ambiente acadêmico* (*campus life*), *ensino* (*teaching*), *produção de pesquisa* (*research*) and *reputação* (*reputation*). There are *rankings* that, in addition to these basic dimensions, consider other dimensions such as the internationalization of the IHES - given the importance of globalization and intense transnational movement of academic personnel (students and researchers); innovation, characterized as the interface of the university with the industry and the patent; and the presence in the Web, recognizing that the virtual environment is an increasingly important role in the dissemination of knowledge generated by universities.

The data obtained to rank the universities can be internal to the institutions - provided by the universities themselves; or external - extracted from databases such as Web *of Science* (WoS) and Scopus, to obtain the number of publications and the number of citations attributed to the institutions; and/or through surveys of opinion among the *stakeholders*, for example. It is verified that in the majority of current classifications of universities the most present criteria are those related to the dimension of the research(*research*), valuing aspects of scientific and technological production of institutions.

For Shin and Toutkoushian (2011), it is very difficult to establish indicators of certain institutional dimensions such as the qualidade de ensino (*teaching quality*), making the majority of university *rankings* especially the global ones, depend heavily on quantifiable measures of institutional performance. Shin (2011) also indicates that the international *rankings* do not consider local dimensions of effectiveness of the IHES, since these aspects represent a measure difficult to capture (especially at the global level), due to the variabilities of the communities in the vicinity of the universities. In this sense, the national *rankings* gain importance to locate a local context of production and impact the performance of universities, which are disregarded in global *rankings*. Sanz-Casado, Garcia-Zorita, Serrano Lopez, Efraín-Garcia and Filippo (2013) point out that the national *rankings* have characteristics which make them more suitable to identify and compare the activity of IHES of a region and country.

4 *The RANKING BRASILEIRO DE PESQUISA* (CWTS *BRAZILIAN RESEARCH RANKING* – BRR)

The BRR is based on the methodology of the global CWTS Leiden *Ranking*, and how it also refrains from arbitrarily combining multiple dimensions of the performance of the university in a single aggregate indicator. The BRR is not also based on data provided by the universities themselves, nor does it use opinion survey data (Martin et al., 2012), common to many *rankings*. Thus, the BRR does not assess institutional dimensions such as reputation, teaching environment, etc., and classifies the Brazilian institutions in a number of bibliometric indicators related to scientific production organized in two dimensions: Impact and Collaboration. The Brazilian higher education institutions are classified into public, private and special, in accordance with the Brazilian Classification of the Ministry of Education and Culture (MEC). In addition to universities, the BRR includes research institutes, hospitals and organizations of mixed economy (for instance Petrobras). Its indicators are both dependent and independent of the size of the institutions, including ranges of stability for the independent measures of the size (CWTS *Brazilian Research Ranking*, 2015).

The size of the Impact considers the following indicators: Total production (P), which refers to the total number of production published by the institutions indexed on WoS under the criteria considered by the *ranking*; quantity of publications in journals considered *Top* among the 10% most mentioned ($P_{Top\ 10\%}$); proportion of 10% of publications considered *Top* (*Publication Proportion* – $PP_{Top10\%}$), which refers to the proportion of publications of a university that belongs to the journals among the 10% most often mentioned, in comparison with other publications in the same field and in the same year; *Média de Pontuação da Citação* (*Mean Citation Score* – MCS), which is the average number of citations of the publications of a university; and the *Média de Pontuação da Citação Normalizada* (*Mean Normalized Citation Score* – MNCS), which is the average number of citations of publications of a university, normalized for differences in the field and year of publication.

Whereas the size of the Scientific Collaboration considers the following indicators: Proportion of institutional publications in collaboration(PP_{collab}), related to the proportion of publications of a university co-authored with other organizations; proportion of publications in international collaboration ($PP_{intcollab}$), related to co-authorships with two or more countries; proportion of publications of collaboration between universities and the industry($PP_{collabU\text{-}I}$), which refers to co-authorships with one or more industrial partners; in addition to consider indicators of distance collaborations (*Mean Geographical Collaboration Distance* – MGCD), with the proportion of collaborative publications of short distance ($PP_{<100\ km}$), considering the publications of a university with a geographical distance of collaboration less than 100 km; and the proportion of collaborative publications of long-distance ($PP_{>1000\ km}$), which is the proportion of publications of a university with a geographical distance of collaboration of more than 1000 Km away. BRR, as well as the CWTS*Leiden Ranking*, do not ponder their criteria, given the sophisticated statistical aggregation derived from MCS, Mncs and MGCD indicators. In Table 1, it is summarized the dimensions and indicators considered by the BRR.

Dimension	Indicators

Impact	P- total production $P_{Top\ 10\%}$ - Quantity of publication among the Top 10% $PP_{Top10\%}$ - Proportion of 10% of publications Top MCS - Average Score of Citation MNCS - Average Score of standardized Quotation
Collaboration	PP_{collab} - Proportion of institutional publications in collaboration $PP_{intcollab}$ - Proportion of publications in international collaboration $PP_{collabUI}$ – Proportion of publications of collaboration of the University with Industry $PP_{< 100\ km}$ - Proportion of collaborative publications of short distance $PP_{< 1000\ km}$ - Proportion of collaborative publications of long distance

Table 1: Dimensions and indicators of the BRR

Source: CWTS *Brazilian Research Ranking*, 2015

5 THE BERLIN PRINCIPLES ABOUT THE*RANKINGS* OF INSTITUTIONS OF HIGHER EDUCATION

The proliferation of *rankings* of universities was accompanied by extensive and diverse controversies related to their methodologies (Teichler, 2011). Such situation led Unesco, through its subordinate organ European Center for Higher Education (*Centre Européen pour l'Enseignement Supérieur* – CEPES), to take the initiative to bring together, in 2004, consultants *ad-hoc* and collaborator entities, such as the *Associação Universitária Europeia* (*European University Association* – EUA), the *Instituto de Política de Educação Superior* (*Institute for Higher Education Policy*), from Washington, DC, and the Center for the German Higher Education Development (*Centrum für Hochschulentwicklung* – CHE), resulting in the creation of the *Grupo Internacional de Especialistas em Rankings* (*International Ranking Expert Group* – IREG). On May 20th, 2006, the IREG presents the document "Berlin Principles for *Rankings* of Institutions of Higher Education" (IREG, 2006) - a set of 16 guidelines to guide the producers of *rankings* in the preparation of their rankings based on four categories:

i. Objectives and aims of the *rankings*;

ii. Methodology adopted: choice and weight of indicators;

iii. Information collection and processing;

iv. Presentation of results in the *ranking*.

The categories of Berlin principles are detailed in Table 2.

Categories	**Principles**
Objectives and aims of the *rankings*	1. To be one among several different approaches for the assessment of higher education. *Rankings* can provide comparative information and better understanding of higher education, but should not be the main method to evaluate an institution of higher education. *Rankings* provide a perspective based on the market that can complement the work of the government, institutions for accreditation and the independent rating agencies. 2. To be clear about the purpose and the public to whom they are addressed. The indicators used to meet a specific goal or to inform an audience may not be suitable for different purposes, or target groups. 3. Recognize the diversity of institutions and take into account different missions and goals. Quality measures for institutions dedicated to the research, for example, are very different from those appropriate to the institutions that offer broad access to needy communities. The institutions that are being classified and the experts who assist the process of classification should be consulted frequently. 4. To be clear about the sources of information and their meaning. The relevance of the results of the classification depends on the audience that receives the information and the source of such information (such as databases, students, teachers, employers). A good practice would be to combine different perspectives provided by these sources, in order to obtain a more complete view of each higher education institution included in the *ranking*. 5. To specify the linguistic, cultural, economic and historical contexts of the system evaluated. International *Rankings* in particular, should be alert to the possibility of bias and be accurate in determining their goals. Not all nations or systems share the same values and beliefs about what constitutes the "quality" in institutions of higher education, and the classification systems should not be designed to force those comparisons.
to be continued	
Continuation	
Categories	**Principles**
Methodology used	6. There must be methodology transparency. The choice of methods used to prepare *rankings* must be clear and unambiguous. This transparency must include the calculation of the indicators, as well as the data source.

	7. Choice of indicators according to their relevance and validity. The choice of data should be based on recognition of the ability of each measure to represent the academic quality and institutional forces, and not on the availability of data. There must be clarity about why the measures have been included and what else they intend to represent. 8. Preference for measuring results. The data on the inputs are relevant, because they reflect the overall condition of a given establishment and are more often available. Outcome measures provide a more accurate assessment of the position and/or the quality of a particular institution or program. The rankings compilers should ensure that an appropriate balance is achieved. 9. Highlight for the weights assigned to the indicators (if used) and limitation of the changes made in them. Changes in the weights make it difficult for consumers to understand if the position of the program or the institution changed in the *ranking* due to a difference inherent in or due to a change in methodology.
Information collection and processing.	10. The ethical standards and recommendations of good practice of these principles must be respected. In order to ensure the credibility of each *ranking*, those responsible for collection and use of data and conducting in *loco* visits should be the as much objective and unbiased as possible. 11. To use auditable and verifiable information whenever possible. Such data have several advantages, including the fact that they were accepted by institutions and which are comparable and compatible among the institutions. 12. To include information obtained in accordance with the appropriate procedures to the scientific collection of data. The data collected from a not representative or distorted subset of students, teachers or other parties may not represent an institution or program and should be deleted. 13. To apply quality assurance measures to the processes of the own *ranking*. The processes used to assess institutions should be used to assess the *ranking* itself. *Rankings* must be continually articulated to develop a better methodology. 14. To apply organizational measures to enhance the credibility. These measures may include consultative bodies or even of supervision, preferably with some international involvement.

to be continued

Continuation

Categories	**Principles**

Presentation of results in the ranking.	15. The *ranking* must provide consumers with a clear understanding of all factors used in their preparation and offer choices in the form of presentation. In this way, users of the *rankings* will have a better understanding of the indicators used to rank the institutions or programs. In addition, they must have the opportunity to make their own decisions about how these indicators should be considered. 16. To be compiled in order to eliminate or reduce errors in the original data and to be organized and presented in such a way that mistakes and failures can be corrected. The institutions and the audience must be informed about the errors that occurred.

Table 2: Berlin principles for *Rankings* of Institutions of Higher Education
Source: IREG (2006)

6 BBR RESULTS and the Berlin Principles

The 16 guidelines of Berlin Principles on *Rankings* of Institutions of Higher Education were compared with available information from the BRR, followed up by analysis and discussion in accordance with the categories of document of IREG, being assigned a *score* to the compliance of the BRR with the requirement of the principle, as indicated in the Methodology: "Not applicable" (IN); "Does Not Meet", with a value of 0%; "Meets partially", drawing 50%; "Meets", with a value of 75%; and "meet totally", with a value of 100%.

6.1 CATEGORY PURPOSES AND OBJECTIVES

6.1.1 Principle 1

To be one of several different approaches for the assessment of higher education (IREG, 2006).

The BRR is not the only way in which the Brazilian higher education institutions are evaluated, and there are other instruments with this purpose, both governmental and private. In the government sphere, the evaluations are carried out every three years by the National Institute of Educational Study and Research Anísio Teixeira (Inep), an organ from the Ministry of Education. The evaluation is based on Law no. 10,861, from 2004, which established the National Evaluation System of Higher Education

(Sinaes); and in the Ministerial Order number 40, dated from 2007, Article 33-B, establishing the e-MEC, flow electronic system and management of information relating to the processes of regulation, evaluation and supervision of higher education. The Inep indicators are based on three parameters: I - of higher education courses: through the concept of Preliminary Course (CPC); II - of institutions of higher education: The General Index of Courses evaluated by the institution (IGC); and III - performance of students: by the concept derived from the results of the National Exam of performance of students (Enade). In addition, there is also the assessment of graduate courses in the country by the Coordination for the Improvement of Higher Education Personnel (Capes).

Another instrument, but private now, for the evaluation of the IHES in Brazil is the *Ranking* Universitário da Folha (RUF), launched by the newspaper *Folha de S.Paulo* in 2012 and currently in its fifth edition. RUF classifies the Brazilian IHES from two foci: the *ranking* of universities and the *ranking* of courses. The version linked to universities considers 195 public and private universities evaluated through five dimensions with specific weights (Folha de S.Paulo, 2016).

BRR *Score*: Meets (75%)

6.1.2 Principle 2

To be clear about the purpose and the public to whom they are addressed. (IREG, 2006).

On the home page of its website, the BRR indicates clearly its goal: "To provide highly accurate measurements of the impact mainly scientific of these organizations and their involvement in scientific collaboration" (CWTS *Brazilian Research Ranking*, 2015). In the same home page, the BRR also indicates the target of the *ranking* – all actors involved with the evaluation of Brazilian research:

> *Brazil is an important fast growing country in science. As a result, research evaluation is gaining importance. Bibliometric indicators can be supportive in that process. With this initiative CWTS wishes to contribute to this task providing methodology as well as results based on many years of experience in this area* (CWTS *Brazilian Research Ranking*, 2015).

BRR *Score*: Meets (75%)

6.1.3 Principle 3

Recognize the diversity of institutions and take into account different missions and goals. (IREG, 2006).

According to Vogel, Mário, Noyons, Kobashi & Faria (2014), CWTS Leiden counted on the collaboration of two Brazilian researchers in its team for preparation of the BRR, in the process of standardization of names in the classification of organizations and in other aspects of the *ranking*. BRR considers the diversity of institutions in accordance with the categorization of MEC, classifying public universities, private and special and research institutes, hospitals and universities and organizations of mixed capital (for instance Petrobras) (CWTS *Brazilian Research Ranking*, 2015).

BRR *Score*: Meets (75%)

6.1.4 Principle 4

To be clear about the sources of information and their meaning. (IREG, 2006).

BRR 2014 indicates that its source is the database *Web of Science* (WoS) Thomson Reuters, located in Philadelphia, USA; and considering indexed publications between 2003 and 2012 (CWTS *Brazilian Research Ranking*, 2015). WoS brings together the ancient foundations of the Institute *for Scientific Information* (ISI) after its acquisition by Thomson Reuters in the 1990s: *Science Citation Index Expanded* (SCI), *Social Science Citation Index* (SSCI) and *Arts & Humanities Citation Index* (AHCI). In September 2014, WoS had 90 million records, including more than a billion references mentioned (Thomson Reuters, 2014). WoS is considered a prestigious database (Cavacini, 2015), but there is criticism for its restriction of indexing of journals and research areas (Hood & Wilson, 2001).

BRR *Score*: Meets (75%)

6.1.5 Principle 5

To specify the linguistic, cultural, economic and historical contexts of the system evaluated. (IREG, 2006).

This principle is similar to the 3rd above mentioned, in recognition of the diversity of institutions, with their different contexts. BRR is based on the methodology of the global CWTS Leiden *Ranking*, which even in the worldwide scope provides the analysis of different institutions by means of their characteristics and similar dimensions, according to their arrangement in the country of origin (Vogel et al., 2014). This form of evaluation approaches institutions similar with each other in terms of mission and institutional typology, being more judicious in relation to the diversity of institutions and existing systems (public and private institutions, research organizations - even those of mixed capital, and university hospitals), in addition to sort the components, groups and affiliations, in seven different areas of knowledge, whereas considering such diversity.

BRR *Score*: Meets (75%)

6.2 CATEGORY METHODOLOGIES

6.2.1 Principle 6

There must be methodology transparency (IREG, 2006).

The methodology of the BRR is available publicly on the web site ranking (CWTS *Brazilian Research Ranking*, 2015), in English language. In Portuguese language, there is the work of Vogel et al. (2014) also documented the BRR methodology. And as already indicated, this methodology is based on the CWTS Leiden *Ranking* – also already documented by Martin et al. (2012). The extensive methodological discussion that preceded the launch of the CWTS *Leiden Ranking* has also been documented by Martin et al. (2011a, 2011b) and Waltman and Schereiber (2013).

BRR *Score*: Meets totally (100%)

6.2.2 Principle 7

Choice of indicators according to their relevance and validity. (IREG, 2006).

As already indicated in principle 6 above, the BRR methodology, based on the CWTS *Leiden Ranking*, is based on extensive work for discussion and methodological analysis - including the calculation of indicators and establishing their relevance and validity - undertaken by researchers connected with the Center of Studies of Science and Technology of Leiden (CWTS Leiden), from the University of Leiden, The Netherlands (Martin et al., 2011A, 2011b; Martin et al., 2012; Martin & Schreiber, 2013).

BRR adopts sophisticated statistical measurements considering *contagem completa* (*full counting*); *contagem fracionada* (*fractional counting*); counting with dependence or independence of the size of the institution; in addition to assigning a range of age of the data through the statistical technique known as *bootstrapping*, which distributes more equitably the weight of collaborative publications; and also normalizes the weights of impact indicators by area - BRR considers seven different areas for their classification. All these measurements make it possible to compare different institutions in different fields (CWTS *Brazilian Research Ranking*, 2015).

BRR *Score*: Meets totally (100%)

6.2.3 Principle 8

*Preference for measuring results (*IREG, 2006).

BRR is explicit in its objectives: "To provide highly accurate measurements of the impact mainly scientific of these organizations and their involvement in scientific collaboration" (CWTS *Brazilian Research Ranking*, 2015). BRR evaluates more specific aspects of the institutions, related to their scientific performance: their result in the production and scientific collaboration.

BRR *Score*: Meets totally (100%)

6.2.3 Principle 9

Highlight for the weights assigned to the indicators (if used) and limitation of the changes made in them. (IREG, 2006).

This principle is related to the various complaints received by the *rankings* due to the variabilities in the weightings, not always in a clear way (Buela-Casal, Gutiérrez-Martinez, Bermúdez-Sánchez & Vadillo-Muñoz, 2007;). BRR, as well as the CWTS Leiden *Ranking*, does not assign weights to their indicators, because, as already indicated, it adopts a set of sophisticated statistical analyzes which dispenses with hierarchy determined by weights assigned. The statistical calculation itself made by the *ranking* – considering the *contagem completa* (*full counting*), *contagem fracionada* (*fractional counting*), the counting with dependence or independence of the size of the organization (the option of advanced parameters of the *ranking*), besides the range of stability of the data - already fit the institutions in accordance with the characteristic chosen to evaluate (CWTS *Brazilian Research Ranking*, 2015).

BRR *Score*: Not applicable (NA)

6.2.3 Principle 10

The ethical standards and recommendations of good practice of these principles must be respected. (IREG, 2006).

The effort of the BRR to achieve a more objective and as impartially as possible methodology for the evaluation of the Brazilian organizations of higher education and research, as is implicit in their goals CWTS *Brazilian Research Ranking*, 2015), in a transparent and documented way, is aligned to the good practices and the ethical standards set out by the Berlin principles for *Rankings*.

BRR *Score*: Meets (75%)

6.3 CATEGORY DATA COLLECTION AND TREATMENT

6.3.1 Principle 11

To use auditable and verifiable information whenever possible. (IREG, 2006).

As already indicated, the origin of the data used by the BRR to evaluate the Brazilian institutions is the well-established database WoS, from Thomson Reuters. It is an external source to the institutions and, although it is a restricted source of data, in Brazil it is accessible through the *Portal de Periódicos da Capes* (2015) by institutions indexed, which enables its access at any time to the due verification of the data collected therein. However, BRR highlights on its website that the assignment of publications for research organizations is not free of errors, due to inconsistencies (although minimal) inherent to the very source of collection in relation to the registry of institutional addresses in the database. The reliability of the data base is directly proportional to the reliability of the results of the *ranking*.

BRR *Score*: Meets (75%)

6.3.2 Principle 12

To include information obtained in accordance with the appropriate procedures to the scientific collection of data. (IREG, 2006).

As already indicated, the source of data collection of the BRR is the database WoS, considering the whole set of bases that comprise it: *Science Citation Index Expanded* (SCI), *Social Science Citation Index* (SSCI) and *Arts & Humanities Citation Index* (AHCI). The data collection was based on the publications of *type artigo*(*article*) and *artigo de revisão* (*review*) with institutional origin from Brazil (via the address of affiliation shown in publications), indexed in the WoS during the period from 2003 to 2012; and considering only the *núcleo* (*core)* of these publications: characterized by its international scope, for publishing in English and by presenting sufficient references in relation to the center of periodicals of WoS base. These requirements exclude about 16% of the journals, especially those in the area of humanities, business journals and popular magazines (Vogel et al., 2014; CWTS *Brazilian Research Ranking*, 2015).

BRR *Score*: Meets totally (100%)

6.3.3 Principle 13

To apply quality assurance measures to the processes of the own ranking (IREG, 2006).

The quality of the processes of the BRR is indicated by the detailed description of its methodology, either in the data collection, or in the identification of the institutions evaluated, or in the indicators adopted, systematized by the CWTS Leiden in order to develop a valid methodology (Martin et al., 2012; CWTS *Brazilian Research Ranking*, 2015).

BRR *Score*: Meets totally (100%)

6.3.4 Principle 14

To apply organizational measures to enhance the credibility. (IREG, 2006).

BRR is a product from CWTS Leiden, which adopts the principles and rules based on rigorous scientific methodology in the systematization of its products and services, which are focused on three axes: *Monitoramento e Avaliação* (*Monitoring & Evaluation*), with studies, indicators and data (for instance the *rankings* CWTS *Leiden Ranking* and reports and analyzes commissioned by government institutions and other audiences); *Análise Avançada* (*Advanced Analytics*) by means of applications and tools developed by the institution and made available to the public (for instance visualization tool VOS *Viewer*, developed by the institution; and *Treinamento e Educação* (*Training & Education*),offering to the public courses in bibliometric analysis for the management and evaluation of research.

It must be mentioned that for both the global CWTS *Leiden Ranking* as for the Brazilian *Ranking* or research, CWTS Leiden considers as a possibility to audit IREG - which, in 2009, already identified as IREG *Observatory on Academic Ranking and Excellence*, or simply IREG *Observatory*, created an audit to certify the *rankings* that follow the best practices recommended by Berlin principles and attributes a certification seal to the listings audited and that comply (IREG, 2009).

BRR *Score*: Meets (75%)

6.4 CATEGORY PRESENTATION OF THE RESULTS OF THE RANKING

6.4.1 Principle 15

The ranking must provide consumers with a clear understanding of all factors used in their preparation and offer choices in the form of presentation. (IREG, 2006).

BRR is presented in detail on its official website, and its methodology, as already indicated in the principles 6 and 7 aforementioned, is extensively explained by the literature (Martin et al., 2011a; 2011b; Martin et al., 2012; Martin & Schreiber, 2013).

In its website, BRR indicates the various ways of carrying out the survey of institutions in BRR, and Vogel et al. (2014) showed in details, through concrete examples such as "read" the BRR. Perhaps the difficulty of understanding the BRR results is due to the sophistication of statistical measures adopted, which requires from the interested public the necessary understanding of the meaning of the indicators and how they are applied by the BRR.

An important point to be worked by CWTS Leiden refers to have information about the BRR on its site also in Portuguese, considering the public speaker of that language, since it is a *ranking* focused on the Brazilian institutions.

BRR *Score*: Meets partially (50%).

6.4.2 Principle 16

To be compiled in order to eliminate or reduce errors in the original data and to be organized and presented in such a way that mistakes and failures can be corrected. (IREG, 2006).

This principle is, in a way, superimposed to the principles listed in category Methodologies and in the category Data collection and processing of the Berlin principles - already compared with the characteristics of the

BRR that discuss the data source used, the methodology adopted and all other procedures to guarantee the reliability of the *ranking*, including considering errors (mostly related to the inconsistency of data extracted from databases).

BRR *Score*: Meets totally (100%)

The *scores* assigned to the BRR according to their conformity to each of the 16 Berlin principles are consolidated in Table 1.

Table 1: Conformity of the BRR to the Berlin principles for *rankings* of HEI

Berlin Principles		**Not applicable**	**Does not meet**	**Meets partially**	**Meets**	**Meets totally**
Category	**Principles**	**NA**	**0%**	**50%**	**75%**	**100%**
Goals and Aims	1				•	
	2				•	
	3				•	
	4				•	
	5				•	
Methodology	6					•
	7					•
	8					•
	9	•				
Data collection and treatment	10				•	
	11				•	
	12					•
	13					•
	14				•	
Results presentation	15			•		
	16					•

Source: own elaboration

It is realized that the conformity of the BRR predominates in "Meets" (with a value of 75% compliance in eight of the Berlin principles, the majority being in category objectives and aims of the *rankings*, in that the BRR is correct in all requirements; followed by "Meets completely", with 100% of compliance in three principles of the category methodology of

rankings, and the 9th principle in that category - on the weights assigned to the indicators of the *rankings* – not applicable because the BRR does not adopt weights on their indicators. BRR also achieves 100% of compliance in two principles of category Data collection and processing; and even in a principle of the category results presentation. The only principle in which the compliance of the BRR figured as "Meets partially" refers to 16th from the category Results presentation, due to the perception of need of BRR also maintain an interface in Portuguese on its website, which is currently only in English. The BRR did not fit in any *score* "Does not meet". The results indicate that the BRR adheres to almost all of the Berlin principles for Rankings of Higher Education Institutions, in accordance with the majority of the principles.

7 FINAL CONSIDERATIONS

The recent emergence of International *rankings* monopolized attention by signaling standards of excellence and quality in Higher Education, causing impact on *stakeholders* – academic community, the managing bodies of public policies, development agencies and even the society, by means of reputation and an expression of public opinion, reflected in the choices for entry into higher education. However, the perception given to the *rankings* as indisputable sources of indication of excellence and institutional quality of the HEI is not free from controversy. Concepts, dimensions, indicators, methods of analysis of information and data, completeness, as well as their effects have been the subject of extensive discussions.

In this sense, the creation of a set of guidelines to guide the development of *rankings* in a transparent and ethic way is an appropriate initiative and welcome, supporting continuous improvement and the improvement of the methodologies used in the various classifications.

In this work, the objective was to verify the adequacy of the Brazilian *Ranking* of research (BRR), the principles for *rankings* exhorted by IREG, since the systematization of the BRR is not a definitive and complete venture , but, an effort of continuous improvement, considering

not only the methodological rigor applied to its procedures, but also the ethical principles required and expected of systems of classification of institutions of higher education and research, increasing its reliability. The comparison made with the Berlin principles for the *Rankings* of Institutions of Higher Education showed that the BRR fits itself in accordance "Meets" in eight of the principles and "Meets completely" in six of the principles, indicating that almost all of its characteristics is suitable for the 16 recommendations indicated.

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