

Research on the Ranking System of Chinese and Foreign Universities ----- rankings focus on the comparison and analysis between similarities and differences

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Abstract. In recent years, the influence of university rankings has gradually expanded, influencing students' choice of university and the direction of schooling in response to social needs. This article will use literature search and comparative method as the main research methods, focus on the criteria used by the four university ranking agencies in China and abroad, and summarize their common experiences and shortcomings in ranking, and put forward suggestions for improving and perfecting university ranking activities in terms of methodology and indicator system design, and self-regulation of university ranking activities.

Keywords: Chinese universities withdraw from the World University Rankings, Literature search method, Comparative analysis method.

1. Introduction

1.1. Research background & topics

The existence and operation of university rankings, which are comprehensive assessments of university groups by ranking agencies, has received widespread attention from all sectors of society in recent years, as their influence has gradually increased, influencing students' choice of university and the direction in which schools operate in response to societal needs. However, despite their imperfection, the university ranking systems are still able to meet the public's demand for open and transparent university information, which cannot be achieved by institutions and government agencies alone. The public also uses university ranking systems as the main objective source of key information about universities. In general, university rankings are no longer just a single third-party system of evaluation, but a comprehensive system that affects the educational standards of institutions, their specific academic research focus and official policy directions.

Many domestic and international ranking agencies have been subjected to varying degrees of challenge from universities and academic researchers during and after the ranking process, most notably from university ranking agencies, but research in this area has not yet received sufficient attention. Therefore, in the long run, the university ranking system will exist for a long time, then the research on what capabilities the university ranking system should have will certainly be valued, which is an important basis to promote the establishment of a sound and healthy development prospect of the university ranking system.

With the gradual development of the higher education system in China in recent years, academic rankings of the world's leading universities have emerged from scratch. This is an important channel for the public to understand information about universities at home and abroad, which will to some extent influence personal choice of university, government policy guidance and university teaching and research tendencies. Therefore, an in-depth study of the judging criteria of university ranking system is conducive to enhancing the credibility of the university ranking system, thus providing a theoretical basis and practical basis for regulating university ranking activities.

This paper use literature search and comparative method as the main research methods, firstly, through literature search, organize and analyze the current situation of the development of university ranking in China and abroad, draw on the criteria of each university ranking system, understand the

existing research on university ranking and its shortcomings, and put forward research questions. Secondly, by comparing the criteria of university ranking systems in China and abroad, analyzing the similarities and differences between the criteria of university ranking systems, identifying the criteria that are bound to be adopted in the development of university ranking systems, summarizing and making corresponding recommendations.

1.2. Data and method

The comparative approach and the literature search are in fact very applicable to this study for three reasons. Firstly, this study aims to answer the question of how to do university ranking activities in a scientific and rational manner, which falls under the category of "how to do". This is a "how to do" question, and in order to arrive at a result, a large amount of data needs to be collected as a basis for analysis and data support, so it is appropriate to use a literature search. Secondly, the aim of this study is to explore the criteria and standards by which university ranking agencies, as third parties, should be judged in order to provide information for university development, society and government regulation. This requires an analysis and comparison of the various prominent university ranking systems available today, as well as a search of the appropriate research literature, from which key data and information can be selected to provide a reliable basis for the study's conclusions. Thirdly, as many well-known Chinese universities have recently withdrawn from international university rankings, this study needs to explore the causes and effects of this phenomenon, and to make recommendations for improving and refining university ranking activities. This will involve drawing on the criteria applied by the existing well-known university ranking systems, as well as collecting relevant government policies and measures. It also requires the application of a literature search and comparative analysis.

The selection of these four university ranking institutions (THE, QS, ARWU, US News) for comparison and analysis is based on the following two criteria. The first is relevance. The university ranking systems built by these four university ranking agencies are the most representative among the world's university ranking agencies, and they are increasingly influential and authoritative in China, and are the models and benchmarks in the industry. Therefore, these four university ranking agencies are chosen as the target of comparison and analysis. Secondly, they are all world-renowned, authoritative and representative in the industry, and have similar influence in the selection of universities for study in China, and in the attention of society and government. Using these four institutions as the objects of comparison, it can effectively obtain the core criteria and judgment standards of the authoritative university ranking system, which is of reference value and provides theoretical support for the research conclusions and relevant recommendations of this study. Thirdly, the consistency between the objectives of this study and the government's policy orientation. Recently, a number of well-known Chinese universities have withdrawn from the World University Rankings, which may imply changes in corresponding policies and measures and the development requirements of educational reform. The four university ranking agencies, as representatives of influence and authority, have a large and relatively well-documented body of relevant information. In short, how to conduct university ranking activities scientifically and rationally needs to take into account not only these four university ranking systems, but also changes in government policies and the actual needs of society. One of the four university ranking systems is published by a Chinese company (ARWU), while the remaining three are established by foreign institutions (THE, QS, US News). This is the reason why these four organizations were chosen for comparative analysis, which helps to achieve research objectives that are in line with national education development plans.

2. The development status of the ranking system of well-known Chinese and foreign universities

2.1. The current development of China's university ranking system

China's university rankings emerged late, but developed relatively quickly. It is generally considered that the "Evaluation of Chinese Universities - 1991 Research and Development" published by Wu Shulian et al. in 1993 in Guangdong

The "Evaluation of Chinese Universities - 1991 Research and Development" published by Wu Shulian and others in Guangdong Science and Technology News in 1993 is the first more complete university ranking. So far, China's university rankings have formed international and domestic university rankings with wide influence, such as China University Evaluation, China University Ranking and China University Comprehensive Competitiveness Evaluation. University rankings have entered a period of prosperous development.

However, the traditional public perception of Tsinghua University and Peking University as the top universities in China has raised questions about the process of organising the rankings and the scientific nature of the results. According to the study, the talent training scores of international top universities based on the China University Rankings are seriously inconsistent with the actual perceptions; it is not rational to measure the scientific research scores of Chinese universities that are not yet world class universities, which already exceed those of the recognised world class universities[1].

In 2003, the first Academic Ranking of World Universities (ARWU) was released by the Research Centre for World-Class Universities of the Institute of Higher Education (formerly the Institute of Higher Education) of Shanghai Jiao Tong University, marking a new stage in the ranking of universities worldwide by China's university ranking agencies. The rankings are based on objective indicators and third-party data. The ARWU has had a major impact on the world and is recognized by universities in some countries. This is one of the famous university ranking systems that will be analyzed in this paper

In 2004, the ARWU was published. The Comprehensive Competitiveness Evaluation of Chinese Universities was jointly developed by the China Science Evaluation Research Centre, China Youth Daily and the China Institute of Science and Technology Information of the Ministry of Science and Technology, and invested by China Youth Daily Media Development Co. In 2003, the China Science Evaluation Research Centre was established with Qiu Junping as its director; in 2004, the Evaluation Report on the Research Competitiveness of Chinese Universities was published; in 2005, the publication of the In 2006, the Centre released 23 competitiveness rankings, including the World University Research Competitiveness Ranking and the World Research Institution Subject Competitiveness Ranking. This is an official university ranking system issued by an official body, which represents the active participation and involvement of the relevant government departments in regulating university ranking activities.

In general, Chinese university rankings have developed rapidly in a relatively short period of time and have formed a diverse ranking system. From the development of Chinese university rankings, Chinese university rankings mainly reflect the following characteristics: (1) Chinese university rankings have a short history of development, but develop rapidly and appear in a relatively concentrated period; (2) Chinese university ranking agencies are mainly organisations with an official nature, and the participation of the news media is relatively low; (3) Chinese university rankings have gradually become clear and diversified in purpose; (4) Chinese university rankings' data are mainly published by the officials, and there is a lack of data provided by the institutions themselves; (5) the ranking of Chinese universities is mainly participated by researchers of universities.

2.2. Current development of university ranking systems abroad

It is generally accepted that the phenomenon of university rankings first emerged in the United States, with the US News and World Report (US News) university rankings published in 1983

representing the earliest university rankings. In the late 19th century, a number of organisations began to classify and rank universities according to the quality of their operations for their own different needs[2].

After 1982, the scope of university ranking was gradually extended to include undergraduate universities. 1983 saw the first undergraduate university ranking by U.S. News & World Report, which divided the 1,308 undergraduate institutions into five categories, based on the Carnegie Classification and used a questionnaire to rank the top five in each category. In 1988, U.S. News & World Report added objective and quantitative evaluation indicators to the questionnaire and gradually settled on five areas: academic reputation, student quality, faculty strength, financial resources, and student retention: the University of Florida's Center for Humanities and Social Sciences released the "Best Research Universities Ranking", which aims to help administrators understand and improve the performance of schools by evaluating The NRC's rankings, which focus on doctoral programs in the US, are designed to help administrators understand and improve the performance of research universities, and include nine categories such as research funding, endowments, and faculty awards. These rankings, with different purposes and forms, reflect the basic conditions of American universities from different perspectives and at different levels [3].

In 1992, The Times published the "Best Universities Guide", which was the earliest university ranking in the UK. In 1992, The Times first published the Good Universities Guide, the first guide to universities in the UK. The guide contained 101 universities and 14 indicators, with a focus on teaching and learning, and provided information for secondary school leavers applying to university. Since then, the ranking system has been updated and refined, and the methodology has become more scientific [4].

From 2004 to 2009, the Times Higher Education Supplement launched the World University Rankings 15 in partnership with QS, a British multinational higher education consultancy providing education services and study abroad services, which has been publishing the World University Rankings in association with the Times Higher Education Supplement since 2004. The rankings are designed to help undergraduate and postgraduate students choose the right university to study in the world. From 2004 to 2009, QS worked primarily with Times Higher Education, focusing on universities in Europe and the U.S. After 2009, it began working with Thomson Reuters to continue its World University Rankings. By 2010, the rankings included nine indicators: student satisfaction, research quality, admission standards, student-teacher ratio, per capita funding, facilities and equipment, outstanding graduates, graduate prospects and graduation rates. Currently, the organization initially evaluates more than 2,000 universities, of which only 700 will be evaluated and the top 400 universities will be ranked. QS also ranks universities by discipline and by region, such as the top 50 universities in psychology worldwide and the top 100 universities in Asia. The QS World University Rankings are one of the world's best-known university rankings in terms of usefulness and reach. In addition, a number of UK newspapers and organizations have also launched university rankings, such as The Financial, The Daily Telegraph, The Sunday Times and The Guardian. The Sunday Times is the most influential, and its rankings use ten indicators: non-employment rate, student satisfaction, student-teacher ratio, peer review, dropout rate, number of outstanding subjects, quality of research, outstanding graduates and percentage of outstanding students recruited[5].

The development of university rankings worldwide has been characterized by the following features: Firstly, university rankings occurred earlier in countries with socio-economic and higher education development. Secondly, the development of university rankings has gone through a process of development from disciplines to universities, from high to low academic levels, and from single to multiple rankings. Thirdly, university ranking institutions have formed a predominantly news media, with increasing involvement of official institutions. Fourthly, the purpose of university rankings has increasingly converged and tended to serve students' choice of schools.

3. Analysis and specific research on the evaluation criteria of the ranking system of well-known Chinese and foreign universities

3.1. The evaluation criteria of China's university ranking system focus on aspect analysis

Table 1. Indicators and weights of the Academic Ranking of World Universities

Metric	Indicator	Weight
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 Science Citation Index-Expanded and Social Science Citation Index	20%
Per Capita Performance	Per capita academic performance of an institution	10%

In terms of the weighting of the ranking indicators, the ranking places more emphasis on faculty quality and research output. The Academic Ranking of World-Class Universities has two levels of ranking indicators, with four indicators at level 1 and six indicators at level 2. This reflects, to some extent, the function of the ranking as an 'academic standard' oriented ranking. In addition, the quality of education and the performance of teachers represent the mirror image of the history and reality of the ranking target respectively. In terms of secondary indicators, the number of Nobel Prize and Fields Prize winning faculty members combined, the number of scientists with the highest number of citations in each discipline, the number of papers published in Nature and Science combined, and the number of papers indexed in Science Citation Index (SCIE) and Social Science Citation Index (SSCI) constitute the majority of the weighting of the ranking indicators [6]. Overall, the secondary indicators focus more on the performance of the 'faculty' in the rankings. The research-oriented design of the indicators has somewhat overlooked the importance of student factors in the academic performance of the world's leading universities. The impact of student and faculty research performance and research outcomes is not measured in the same way as the overall academic performance of the ranking.

Overall, the ARWU Academic Ranking of World Universities has the following two distinctive features: (1) Academic. The ranking indicators of the ARWU Academic Ranking of World Universities reflect its "scientific research" oriented character. The design of the ranking indicators focuses on the academic activities of the faculty members who are the subject of the ranking, and the quality of the faculty members and their research results directly reflect the nature of the ranking. The ranking indicator system reflects the characteristics of academic orientation. (2) Teacher quality is central. The ranking indexes are dominated by the study of 'teachers'. The quality of education, the quality of teachers, the quality of research outputs and the average value of teachers all represent the 'teacher performance' of the ranking target. It is true that the quality of teachers is an important guarantee of the academic quality of a first-class university, but building a world-class university is not about building a "university of first-class teachers"; a high-quality student body is also a visible feature of a world-class university.

3.2. The evaluation criteria of foreign university ranking systems focus on aspect analysis

Table 2. Indicators and weights of the Times Higher Education(THE)--- (2010 up to the present)

Metric	Indicator	Weight
Teaching (the learning environment): 30%	Reputation survey	15%
	Staff-to-student ratio	4.5%
	Doctorate-to-bachelor's ratio	2.25%
	Doctorates-awarded-to-academic-staff radio	6%
	Institutional income	2.25%
Research (volume, income and reputation): 30%	Reputation survey	18%
	Research income	6%
	Research productivity	6%
Citations (research influence): 30%	Citations to publications indexed by Elsevier's Scopus	30%
International outlook (staff, students, research): 7.5%	Proportion of international students	2.5%
	Proportion of international staff	2.5%
	International collaboration	2.5%
Industry income (knowledge transfer): 2.5%	Research income an institution earns from industry	2.5%

The THE World University Rankings are a two-tier system of indicators, the most significant feature of which is the inclusion of indicators from reputation surveys, which are weighted more heavily, and the relative stability of the THE University Rankings until 2009, after which the system has changed considerably.

Prior to 2009, THE worked with QS to publish the rankings of the world's top universities. Following the termination of the partnership with QS in 2008, in 2009, the ranking indicators for THE World University Rankings were removed from the employer survey and peer review accounted for 50% of the indicators.

In terms of changes in secondary indicators since 2010, the weighting of secondary indicators in THE World University Rankings has changed considerably. In terms of changes in the number of indicators, the number of secondary indicators was the same in 2010 and 2012, but in 2012 the indicator 'international research' was added to the international perspective and the indicator 'ratio of research income from public sources to total research income' was removed from the research indicator. The indicator "ratio of research income from public sources to total research income" was reduced. No other indicators have changed. In terms of the weighting of the indicators, the primary indicators of industry income, teaching and research remain unchanged, the weighting of citations is reduced and the weighting of international perspectives is increased; in the secondary indicators, international research is added under international perspectives and given a weighting of "2.5%". This change indicates that the design of THE University Rankings indicators is increasingly focused on the internationalization of universities, in line with their functional positioning. The Reputation Survey indicator has changed significantly, from 50% in 2009 to 34.5% in 2010 and 33% in 2012. The weighting of the Reputation Survey indicators has been decreasing.

The major changes to the indicators and their weighting in the THE World University Rankings occurred after THE's intermediary partnership with QS. Due to changes in the organization within the ranking body and the expansion of the sources of data (Thomson Reuters, i.e. the data company), the change in the system of indicators for THE World University Rankings reflects THE's continued focus on its functional positioning in the reform process - to serve students' choice of schools worldwide. The changes are reflected in two main areas: firstly, there is an increased focus on

internationalization. Research is a core indicator of the standard and quality of provision of world-class universities. The increase in the number and weighting of internationalization indicators further emphasizes the fact that the THE World University Rankings place internationalization in the context of world-class universities not only in terms of the internationalization of people, but also in terms of the internationalization of research and its associated resource flows. Secondly, the weighting of the Reputation Survey indicators has been reduced accordingly. Overall, the weighting of indicators related to reputation surveys has been reduced at a relatively rapid rate [7].

Table 3. Indicators and weights of the US News university ranking system

Ranking Indicator	Weight
Global research reputation	12.50%
Regional research reputation	12.50%
Publications	12.50%
Books	10%
Conferences	10%
Normalized citation impact	10%
Total citations	7.50%
Number of publications that are among the 10% most cited	5%
Percentage of total publications that are among the 10% most cited	5%
International collaboration – relative to country	5%
International collaboration	5%
Number of highly cited papers that are among the top 1% most cited in their respective field	2.50%
Percentage of total publications that are among the top 1% most highly cited papers	2.50%

After years of development, US News has gradually become the authority in the evaluation of American universities, and its evaluation methods and results have been widely accepted by the American public[8].

Table 4. Indicators and weights of the QS university ranking system

Metric	Weight
Academic Reputation	40%
Global Employer Reputation	10%
Faculty/Student Ratio	20%
Citations per faculty	20%
International Faculty Ratio	5%
International Student Ratio	5%

The QS World University Rankings are the largest and most complex ranking of universities, covering more than 11,000 places in 46 different academic fields across five disciplines: arts and humanities, social sciences and management, natural sciences, engineering and technology, and life sciences and medicine.

The QS World University Rankings are based on a questionnaire and use a range of academic indicators to measure the impact of the world's universities, with specific indicators and their weights being.

3.3. Comparing the differences in emphasis on the evaluation criteria of Chinese and foreign university ranking systems

In summary, this study summarizes and integrates the indicators of the ranking system of major well-known universities, and divides the university evaluation index system into 10 areas: student origin (student profile), faculty team (faculty level, faculty/student ratio), teaching situation (Strengths of the discipline, quality of talent development), Scientific research (scientific teams, number of citations), reputation (academic reputation, social reputation, etc.), internationalization (international students, foreign teachers, etc.), graduation (number of graduates, degrees awarded, etc.), student employment, library resources (book collections, per capita book holdings, etc.), social contribution (efficiency and effectiveness, patents granted, etc.), etc.[9].

4. Recommendations for improving and refining university ranking activities

4.1. Findings and conclusions of the study

The history of university ranking shows that the phenomenon of university ranking both at home and abroad emerged before the formation of ranking agencies. However, it was only after the emergence of university ranking agencies that the influence of university ranking activities expanded rapidly, and university ranking methodologies and organizational procedures gradually began to be standardized, transparent and scientific in practice. Therefore, the formation of university ranking institutions determines the trend of university ranking. Based on the interests of the institution and the needs of the "consumer", university ranking agencies build a system of ranking indicators based on the main forms of activity of the university organization, using the results of university ranking as a tool to realise the functional positioning of the institution.

University ranking activities should focus on the collection of data for the university ranking indicator system, as accurate data sources are the basis for an objective and fair reflection of the real situation of universities. Due to the wide scope, many targets and large scale of the data survey, this likewise requires the government to verify and supervise, regularly collate and then release to the society the data related to the level and conditions of higher education institutions. The US and New Zealand university rankings use questionnaires, computer searches and peer expert reviews to collect data, and finally the data collected will be verified through various means to ensure the authenticity, reliability and accuracy of the data. This allows for better monitoring of the development of universities, and at the same time enables the university ranking agencies to obtain accurate and reliable data and the healthy development of university ranking activities, thus fulfilling the function of university ranking to promote the quality of university teaching[10].

4.2. Impact and implications of the study

This study provides an in-depth analysis of the judging criteria of four famous university ranking systems, understands the research and shortcomings of existing university ranking issues, analyses the similarities and differences of the judging criteria among university ranking systems, and identifies the judging criteria that the development of university ranking systems will inevitably adopt, which is conducive to providing a theoretical basis and a practical basis for regulating university ranking activities, thereby enhancing the credibility of university ranking systems. University ranking agencies will also be able to conduct university ranking activities in a more scientific and rational manner, providing information for university development, society and government regulation as a third party participant.

4.3. Future Prospects

This study is limited by time constraints and old sources of information, and does not have sufficient knowledge of the latest university ranking activities, and is bound to miss some of the changes in university ranking system criteria that have only occurred in recent years. In addition, as

the information disclosure mechanism of universities in China is not yet complete, it is difficult to obtain objective data for university ranking, which will affect the scientific accuracy and credibility of university ranking activities.

5. Conclusion

There are several areas that our universities can selectively do well to improve their university ranking ratings. First, to increase the output of research results, including research results and academic results; second, to improve and maintain the reputation of the university, including academic reputation, social reputation, distinguished alumni and national positioning; third, to increase the construction of research and academic resources, we should invest more resources in various bases, equipment, key disciplines and key laboratories to ensure steady and healthy development. Fourth, we should strengthen the construction of teachers, mainly by strengthening the school's teaching force, which includes the number of academicians from two academies and national teaching teams, as well as increasing the proportion of teachers with senior titles and the school's teacher-student ratio, among other data. Fifth, the quality of students should be improved, including improving the quality of student enrolment and graduates, and strengthening the training of current students.

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