The development of world’s best universities
-Visual analysis of TIMES university rankings based on Tableau

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Abstract. With the stable and gradual development of the world economy, people have lived a better life than in the previous decade. In order to allow children to receive better education, studying abroad has become a very popular choice for students. The rapid increase in the number of international students also provides sufficient research motivation significance for how to screen the work of world universities. The Times Higher Education World University rankings, as a well-recognized basis for world university rankings, has become the research focus of this paper. In addition, the methodology of THE world university rankings and the original database (from kaggle) of the research on the 2023 university rankings are emphasized, and the analysis and research work are mainly carried out from the three aspects of teaching; research and citations. Enter the data into Tableau to get an intuitive visual chart to illustrate the ranking of world-class universities and the relationship between the above three aspects. At the same time, it intuitively shows the ranking of the world's top universities’ distribution, also the number and popularity of international students. Give international students objective advice on studying abroad to help students choose the universities they are interested in more intuitively.

Keywords: world university rankings; data visualisation; Tableau.

1. Introduction

Any measurable objective entity should undergo public observation and consideration. Universities, as significant educational institutions, should naturally be subject to public scrutiny. Therefore, university rankings, as a means of assessing and evaluating universities from a market perspective, hold a crucial position in higher education evaluation policies (Ma, 2022). Quality education and lifelong learning opportunities are crucial to guaranteeing a life of abundance and sustainable progress for everyone (Berlian, Setya, 2023) By offering a comparative view based on factors such as academic reputation, faculty expertise, research output, and facilities, university rankings aid prospective students, families, and educators in evaluating institutions for pursuing desired courses or degrees, thus playing a critical role in making well-informed decisions about higher education options.

This article analyses the most representative and comprehensive world university ranking report, 'The Times Higher Education World University rankings,' which is known for its comprehensive and balanced set of indicators. Starting with an examination of THE's methodology, the paper discusses the ranking of the top global universities in 2023. What sets this study apart from previous ones is its utilization of visual data processing on the original dataset, presenting the results through visualizations created using Tableau.

2. Methodology of TIMES

The number of international students has grown exponentially in the past few years, and more and more students are choosing to study abroad because they can enhance their global citizenship through the people and cultures of different countries (Kishino and Takahashi, 2019). With the popularity of studying abroad, the ranking of world universities has become an important reference for international students when selecting a university to get a college
degree. The Times World University Rankings report has become an important indicator for international students to consider when they are choosing a school.

The Times Higher Education World University Rankings stand as the exclusive global performance benchmarks that assess research-intensive universities across all fundamental objectives, ensuring the most extensive and equitable comparisons. Utilizing 13 precisely calibrated performance indicators, these rankings offer comprehensive and balanced assessments, accompanied by 11 specialized rankings for individual subjects. Moreover, leveraging the robust database supporting the World University Rankings, we present an array of regional and thematic rankings, providing profound insights into an expanded array of universities spanning diverse missions. These encompass the Arab University Rankings, Asia University Rankings, Latin America University Rankings, World Reputation Rankings, and Young University Rankings. (World University Rankings 2023: Methodology).

The performance indicators are grouped by five areas, which are 30% Teaching (the learning environment); 30% Research (volume, income and reputation); 30% Citations (research influence); 7.5% International outlook (staff, students and research); and 2.5% Industry income (knowledge transfer).

The evaluating indicators of various world university rankings are similar, but each has its own emphasis on weight distribution. Comparing the three most representative rankings: THE, QS, and US News, THE's indicator background is the most completed one. It emphasizes balance, inclusiveness, institutional size, and places less emphasis on per capita metrics. The ranking involves all indicators and has a relatively average weight. However, the QS indicator system is relatively straightforward, with a higher proportion of subjective factors such as reputation. In the US News World University Rankings, there is a greater emphasis on objective indicators related to research and publications (Guo, Zhang, et al, 2018). It is evident that THE's ranking report is the most comprehensive one. Consequently, I selected a database based on THE's scoring system as the background to analyze the 2023 THE World University Rankings and provide more equitable and reasonable advice for international students.

This report is a visualisation analysis of the Times World University Rankings 2023. The data comes from Kaggle's datasets named "World University Rankings 2023", which includes 104 counties 1799 universities.
3. Data visualization

Tableau is a powerful and flexible data visualization tool that helps users better understand and analyze data to support data-driven decisions and insights (Kristen, 2019). The dataset processed in this paper spans multiple years and is of significant scale, while Tableau possesses robust performance and the capability to handle large-scale data. By visualizing the data using Tableau, it becomes more intuitively comprehensible. Therefore, this paper selects Tableau as the analytical tool to present data trends, correlations, and patterns more easily through a visual approach.

To get a dataset containing all the data for 2013, 2022 and 2023, first I created an union set in Tableau containing all the data for all years. Then created calculate field named the "year" to get the available year attributes.
Figure 1 shows the top 10 universities in the ranking for both 2013 and 2023 by their overall scores. It is not difficult to see that there is not much difference between the top 10 universities in the world over last 10 years. However, it is worth noting that the University of Chicago, ranked 10th in 2022, falls out of the top 10 in the 2023 ranking and is replaced by the Imperial College London with an overall score of 90.4. Also, The California Institute of Technology dropped from top one in 2013 to No. 6 in 2023.

University of Oxford has seen a significant improvement in its overall score over the past decade, rising from 93.7 points in 2013 to 96.4 points in 2023. It has become the university with the most
substantial increase in overall scores from the past ten years and has held the top global ranking for two consecutive years since 2022.

By comparing the scores of various performance indicators in the dataset, it is evident that The California Institute of Technology experienced a decline in both teaching and citation scores from 2013 to 2023, with the citation score showing the most significant decrease. This has resulted in it being the university with the most substantial decline in rankings over the past decade.

![Figure 2](image)

It is also worth noting that Tsinghua University and Peking University have excellent scores in teaching, research and industry income, but still fail to enter the top ten in the world. The most important reason is that citation and international outlook are far lower than the scores of the top ten universities. Creating a top-tier university necessitates achieving exceptional outcomes in scientific research. The primary indicators of a university's core competencies include the production and quality of research papers across various disciplines within the institution, as well as the quantity of papers indexed in citation databases. Furthermore, the institution's impact holds significant importance when assessing elite universities. It represents not only intrinsic value but also serves as a form of soft power, embodying a logical, demonstrative, and reflective aspect of the university's progress (Guan, Hu, 2021).
As can be seen from the figure 3, the US, UK, and Germany are the countries with the most top 100 schools. They are marked on the map separately. Also, it can be observed that there are more developed countries. We will proceed to use a more precise numerical table to calculate the number of countries, universities, and their respective proportions.
Table 1

<table>
<thead>
<tr>
<th>Country name</th>
<th>Numbers of top100</th>
<th>Developed country (Ed) or Developing country (Ing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>7</td>
<td>Ed</td>
</tr>
<tr>
<td>Belgium</td>
<td>1</td>
<td>Ed</td>
</tr>
<tr>
<td>Canada</td>
<td>4</td>
<td>Ed</td>
</tr>
<tr>
<td>China (Hong Kong ind)</td>
<td>12</td>
<td>Ing</td>
</tr>
<tr>
<td>France</td>
<td>4</td>
<td>Ed</td>
</tr>
<tr>
<td>Germany</td>
<td>9</td>
<td>Ed</td>
</tr>
<tr>
<td>Japan</td>
<td>2</td>
<td>Ed</td>
</tr>
<tr>
<td>Netherlands</td>
<td>7</td>
<td>Ed</td>
</tr>
<tr>
<td>Singapore</td>
<td>2</td>
<td>Ed</td>
</tr>
<tr>
<td>South Korea</td>
<td>3</td>
<td>Ed</td>
</tr>
<tr>
<td>Sweden</td>
<td>1</td>
<td>Ed</td>
</tr>
<tr>
<td>Switzerland</td>
<td>4</td>
<td>Ed</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>10</td>
<td>Ed</td>
</tr>
<tr>
<td>United States</td>
<td>34</td>
<td>Ed</td>
</tr>
</tbody>
</table>

Table 2

<table>
<thead>
<tr>
<th>Year</th>
<th>Numbers of developed country</th>
<th>Numbers of developing country</th>
<th>Proportion of developed country</th>
<th>Proportion of developing country</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>96</td>
<td>4</td>
<td>96%</td>
<td>4%</td>
</tr>
<tr>
<td>2023</td>
<td>88</td>
<td>12</td>
<td>88%</td>
<td>12%</td>
</tr>
</tbody>
</table>

Figure 4 presents the distribution of all the top 100 universities in 2023 using Tableau. The following tables conclude Figure 4, providing specific numbers and proportions.

From the table, we can see that in the year 2023, the top 100 universities in the world are distributed across 14 countries. Among these, 13 are developed countries, constituting 93% of the total, and one is a developing country, making up 7%. Out of the top 100 universities, 88 are located in various developed countries, while 12 universities are in China. This data indicates that compared to the year 2013, the proportion of the world top 100 universities in developing countries has increased from 4% to 12%.

The assessment of internationalization in higher education is the result of societal driving forces. Countries require internationally-oriented talents to enhance their international competitiveness; therefore, the weightage of internationalization in university evaluations has gradually increased. Universities, in turn, boost their academic strength and reputation by enhancing their internationalization efforts. Consequently, developed countries have implemented various proactive measures to increase the competitiveness of their higher education systems in the face of fierce global competition, attracting a larger number of international students. This reciprocal relationship benefits both nations and universities, driving the internationalization of higher education in developed countries and leading to improved university rankings (Yu, Du, 2020).

Furthermore, from the table, it is evident that the United States significantly outpaces other countries in terms of high-quality universities. The United States provides valuable lessons in higher education investment and operational philosophies. U.S. universities operate with a more autonomous and diversified income model (Wang, Du, 2019), allowing them to secure substantial financial support for sustaining university development. In contrast, China, as the sole developing country, relies primarily on government funding for its university operations, resulting in limited autonomous
revenue (Hu, 2019). This is an issue that all developing countries must address to effectively enhance the internationalization and rankings of their universities.

Figure 5 is a boxplot chart that shows the top 100 universities with the largest number of international students, from left to right ranked by the largest to the smallest amount. The dots on each box represent a school in that country, and we can see that the US has the most top100 universities, which has a much higher number of international students than any other countries. The UK and Australia have 9 and 7 universities respectively, and their number of international students is also very impressive.

It can be seen that these three countries are the most preferred choices for international students, which also indicates that they are more likely to attract international students than other countries.

The decision factors for international students to leave their home countries and pursue education abroad include the quality of education, tuition and living costs, scholarship opportunities, post-graduation career prospects, health and safety, and the opportunity to learn different languages, among others (Ravichandran, 2019). The United States, the United Kingdom, and Australia are known for their relatively strong university rankings and high-quality education.

The United States stands out for its diverse and comprehensive education system. It offers a wide range of academic programs and research opportunities, making it attractive to international students (Anayat, 2013). Additionally, the U.S. is known for its cultural diversity, which allows international students to interact with people from various cultural backgrounds.

The United Kingdom is renowned for its prestigious universities and academic excellence. It offers a rich historical and cultural experience, making it a desirable destination for international students seeking a top-notch education.
Australia's main advantage lies in its cultural diversity, offering international students the opportunity to engage with people from various cultural backgrounds. It has gained popularity for its high-quality education and welcoming environment for international students.

These countries' strong university rankings and educational quality contribute to their appeal for international students, who weigh these factors alongside other considerations when making their decision to study abroad.

Finally, I will conduct a focused analysis of the top ten universities in the 2023 Times Higher Education World University Rankings. I will use Figure 6 to illustrate their performance in the three main evaluation criteria, thereby analysing their respective areas of emphasis.

From the methodology we know the three highest ranking factors are teaching, research, and citations. Figure 6 provides a good way for international students to choose by ranking the three indicators of performance. If a student prefers a better education environment (teaching), Harvard University is the best choice, while Oxford University is the best choice for research ranking. It is worth noting that among the top 100 ranked universities, the university with the highest citation ranking is not included in. Of course, these three points cannot serve as necessary conditions for measuring the excellence of a university. As mentioned earlier, the international outlook of a university, as exemplified by Tsinghua University and Peking University, is also crucial. When it comes to choosing a university, it's important to consider not only rankings in specific academic fields but also to take into account your individual circumstances in order to select the most suitable university.

4. Conclusion

This article utilizes three years of actual statistical data from Kaggle and employs Tableau for visual analysis. Through the generated charts, it provides a detailed exposition of the rankings and
distribution of the top 100 universities worldwide. It also compares the quantity and proportions of the top 100 universities in developed and developing countries from 2013 to 2023. This sheds light on the disparities in university rankings and a country's inherent performance in the development of its university system. It emphasizes that a country's economic support for universities should not rely solely on government funding.

The paper also lists the three most favored countries for international students, offering sound reasoning for their advantages. This aims to provide students with more informed guidance when selecting a study-abroad destination. Finally, through an analysis of the top ten universities globally, it provides reasoned recommendations. International students are encouraged to choose countries and institutions that align with their specific academic needs, enabling them to effectively immerse themselves in the study-abroad experience and clarify their life goals.

References


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