Global University Rankings: Characterization of Higher Education Institution's Competitiveness

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ABSTRACT

Global university rankings serve as information tool for students in choosing their studies, whereas institutional leaders regard them as a management and strategic decision-making tool. However, little is known about the relevance of global university rankings for developing countries like the Philippines. Using cluster analysis and stepwise regression, this study investigated the competitiveness indicators among clusters of top-ranking universities from three different global university-ranking organizations namely. Furthermore, it also created a best-fit model that accurately predicts institutional performance that could be used by universities in the Philippines that have not made it yet in the global ranking. The data were gathered from the official results of the 2022 global rankings from Times Higher Education (THE), Quacquarelli Symonds (QS), and Academic Ranking of World Universities (ARWU). In assessing the data gathered, the study used cluster analysis and then stepwise regression to come up with the best-fit model. The results of the cluster analysis revealed that the three ranking organizations use diverse factors that contribute to institutional rankings. Each ranking system provides a different lens through which to view and understand the global landscape of higher education. On the other hand, the stepwise regression revealed that Model 3 that combined the THE, Shanghai, and QS rankings predictors serves as the best fit model as it showed a very high positive relationship. Hence, this study concluded that focusing on the key metrics common among the ranking organizations can help institutions drive effective strategies for elevating their rankings.

Keywords: Characterization, global rankings, university, competitiveness

INTRODUCTION

Global university rankings have become a worldwide phenomenon and a widely anticipated event in academia every year. It plays a crucial role in designing national higher education policies and, in a narrower sense, building competence in a higher education institution. For future students, global university rankings are an information tool for choosing their studies, whereas institutional leaders regard them as a management and strategic decision-making tool (Hazelkorn, 2015; Hewitt, 2021). In the present era of the globalized landscape, the competitiveness of higher education institutions is increasingly challenged resulting in a surge of interest in university rankings.

The importance of rankings in today's world cannot be overrated. With a plethora of global university rankings published each year by esteemed organizations like the Times Higher Education (THE), QS World University Rankings (QS), and the Academic Ranking of World Universities (ARWU), it becomes evident how these rankings affect the landscape of competing universities around the world. These rankings use different factors to determine the top universities in the world. It investigates the areas of quality education, research output, student outcomes, internalization, faculty quality, and many others that have become critical in determining the overall reputation of universities worldwide. As a result, universities are now vying to be at the top of these rankings. Doing so improves their global image and attracts potential students and faculty members.

To stay ahead of the curve, universities must focus on improving their global ranking to attract the brightest minds from around the world and cement their place among the top-tier universities. It is no problem for highly developed countries such as the United States, Australia, Canada, and Germany, whose governments generally

view global rankings as a mechanism to strengthen their higher education institutions' competence to compete with other top-ranked higher education institutions and maximize their reputation (Dembereldorj, 2018; Khan et al., 2020; Sanikova et al., 2021). However, little is known about the relevance of global university rankings for developing countries like the Philippines. It is unclear how these rankings shape the competitiveness and characterization of higher education institutions in developing economies. With this research gap, this study aimed to investigate the competitiveness indicators among clusters of top-ranking universities from three different global university-ranking organizations namely; THE, QS, and Shanghai Ranking. Furthermore, it also created a best-fit model that accurately predicts institutional performance that could be used by universities in the Philippines that have not made it yet in the global ranking. There is a need to conduct such study since it is evident that only a few of the HEIs in the Philippines have made it to the world rankings. This research could help the universities in the Philippines vie to the known reputable institutions standing in the wider world of higher education through its competitive indicators.

Hence, the main objective of this paper was to create a best-fit model that higher education institutions in the Philippines could model by considering the criteria and indicators of the identified global university-ranking organizations.

Conceptual Framework

Global University Rankings. Global university rankings are assessments or lists that rank higher education institutions (universities) worldwide based on various criteria and indicators (Rust & Kim, 2012). These rankings aim to provide a comparative evaluation of universities on a global scale, allowing stakeholders such as students, parents, policymakers, and academics to make informed decisions and assessments regarding the quality and reputation of institutions. This study will compare three of the most prestigious ranking organizations in the world; the Academic Ranking for World Universities, the Times Higher Education, and the Quacquarelli Symonds World University Rankings.

The Academic Ranking for World Universities (ARWU), also referred to as the Shanghai University Ranking, is a globally recognized university ranking. It was initially created in 2003 by the Center for World-Class Universities at Shanghai Jiao Tong University and received funding from the Chinese government. Currently, the ranking is maintained by the Shanghai Ranking Consultancy, ensuring its continuity and relevance in the field of higher education assessment (Pavel, 2015). This ranking institution uses six objective indicators such as staff awards, highly cited researchers, papers published in nature and science, papers indexed in science index-expanded and social science citation index, quality of education, and per capita performance of an institution.

On the other hand, the Times Higher Education (THE) ranking is another prominent global university ranking that was initially published from 2004 to 2009 in partnership with Quacquarelli Symonds (QS). However, in 2009, THE decided to end this association and formed a collaboration with Thomson Reuters. This collaboration led to the development of THE's own methodology, and the first ranking based on this new methodology was published in 2011(Pavel, 2015). This change allowed THE to have more control over the ranking process and tailor it to their specific criteria and objectives. These criteria include teaching, research, citations, industry income, and international outlook.

The third world ranking organization that will be included in this study is British Quacquarelli Symonds (QS) which publishes annually. The ranking encompasses both global overall and subject rankings, identifying the top universities worldwide for the study of 51 different subjects and five composite faculty areas. Additionally, it includes independent regional tables, such as Asia, Latin America, Emerging Europe and Central Asia, and the Arab Region. These regional tables provide specific rankings tailored to each respective geographic area, allowing for a more comprehensive and localized assessment of universities within those regions (Laura, 2023). QS's criteria for ranking universities in the world include academic, employer reputation, faculty/student ratio, citations per faculty, international student ratio, and international staff ratio.

Competitiveness. In understanding the term "competitiveness," it is crucial to explore its general definition and the specific notion of higher education institutions. The concept of competitiveness is frequently employed to

describe the capability or characteristic of an entity to surpass others in its respective field, among a range of similar entities. This notion can be applied to various contexts, such as services, companies, industries, regions, and employees, in order to assess their relative level of competitiveness (Kireeva et al., 2018). In other words, competitiveness refers to the ability of the company or organization to cope with competition. The competitiveness of a higher education institution (HEI) has traditionally been closely associated with the quality of its educational offerings. This quality is reflected in the institution's ability to produce highly skilled and knowledgeable graduates. From a market perspective, the measure of this competitiveness lies in the successful integration of these graduates into the labor market. However, their concept of competitiveness has broadened as a result of the total transformation in their frameworks of operations in recent years. Competitiveness already encompasses a wide range of dimensions, reflecting the comprehensive nature of the concept. It includes economic factors, market dynamics, philosophical aspects, social considerations, legal frameworks, and psychological elements, among others. Together, these dimensions contribute to the overall understanding and characterization of competitiveness within the context of HEIs (Lombardi et al., 2017). A higher education institution's likelihood of survival in the future is significantly increased if it maintains a high level of competitiveness, as this attracts students who are more inclined to pursue further studies there. In contrast, institutions that fall behind in the competitive landscape face a lower probability of attracting and retaining students, thereby jeopardizing their future sustainability.

Higher Education Institutions. Higher Education Institution refers to any post-secondary institution of learning that affords a degree (Britannica, 2023). Higher education institutions (HEIs) play a crucial role in the advancement and facilitation of lifelong learning. With their distinct ability to cultivate skills, foster knowledge, and mobilize educational resources, HEIs possess the potential to offer learning opportunities to a wide range of individuals. The concept of lifelong learning signifies a significant shift in the traditional role of HEIs. While their historical focus has been primarily on educating young students transitioning from secondary schools, the emphasis now expands to encompass learners from diverse backgrounds who enter higher education at various ages and stages of their personal and professional lives (Istvan et al., 2016). HEIs are uniquely positioned to meet the evolving educational needs of individuals throughout their lifetimes. They offer a broad spectrum of programs, courses, and learning pathways that cater to the diverse interests, goals, and schedules of learners. This inclusivity allows for greater access to education and the opportunity for individuals to enhance their knowledge, acquire new skills, and pursue personal and professional development at any stage of life. With a number of HEIs around the world offering similar courses, competitive faculty, and caliber graduates, competition has become a norm and each one must establish their competitiveness.

METHODOLOGY

This study used quantitative methods to explore the characterization and competitiveness of universities that made it to the top 100 in the 2022 global university rankings of THE, ARWU, and QS rankings. This aimed to create a best-fit model that higher education institutions in the Philippines could model. The study's first step was to conduct data mining of the 2022 global university ranking results from reputable organizations. Upon the completion of the data mining, it was determined by the researchers that three ranking organizations have similar criteria in ranking and offered complete data sets for the year 2022. Hence, these data were used. Then, the data were cleaned and pre-processed to be consistent across the three ranking organizations. Each ranking organization has a different number of top-ranking universities in the world, hence for the sake of uniformity, this study only chose the top 100 universities that were included in the dataset. Once the data were cleaned, cluster analysis grouped the universities using various criteria. After the clusters of universities are determined using SPSS, the characteristics of each cluster was evaluated. It also included analyzing the similarities and differences between universities within each cluster. Based on the results, the researchers created a best-fit model that HEIs could use to identify the characteristics that could include them in the global university rankings.

Ethical Considerations

This research does not involve any human beings as participants in the study, hence no need for an informed assent or consent.

All information gathered will be held with the utmost confidentiality and used only for the completion of the study. The unbiased and fair analysis will be observed, without predetermined agendas or result manipulation, promoting objectivity and transparency. This study did not add or construct inaccurate facts or observations in the data gathering. No claims were made based on incomplete or assumed results. This study did not contain any trace of misrepresentation or manipulation of results in order to fit a theoretical expectation, and neither was there be any evidence of exaggeration.

Conflict of interest was not evident in this study. There was no intent by the research to disclose any information detrimental to the welfare of the organizations mentioned in the study such as the different universities and ranking organizations.

The research documented the series of revisions as per the advice and recommendation of the panelists. It followed the standards of the Bukidnon State University Ethics Review Committee for the guidelines and ethical considerations of the study.

RESULTS AND DISCUSSIONS

Table 1 presents the cluster of universities in the Shanghai University Rankings.

Cluster	No. of countries	Within cluster sum of squares	Average distance from centroid	Maximum distance from centroid
1	1	0.0	0.0	0.0
2	7	7,248.8	30.0	46.0
3	92	86,699.8	28.1	69.6
Cluster 1	Harvard University			
Cluster 2	Stanford University; Massachusetts Institute of Technology (MIT); University of Cambridge; University of California, Berkeley; Princeton University; California Institute of Technology; University of Chicago			
Cluster 3	University of Oxford; Columbia University; Yale University; Cornell University; University of California, Los Angeles; Johns Hopkins University; University of Pennsylvania; Paris-Sac lay University; University of Washington; University College London; University of California, San Francisco; ETH Zurich; University of California, San Diego; University of Toronto; Imperial College London; Th University of Tokyo; New York University; Tsinghua University; Washington University in St. Louis; University of Michigan-Ann Arbor; University of North Carolina at Chapel Hill; Northwestern University; Duke University; The University of Melbourne; University of Wisconsin-Madison; Peking University; The University of Edinburgh; Zhejiang University; The University of Texas at Austin; The University of Manchester; University of Copenhagen; PSL University; Karolinska Institute; Kyoto University; Sorbonne University; Rockefeller University; University of British Columbia; University of Minnesota, Twin Cities; The University of Queensland; King's College London; University of Illinois at Urbana-Champaign; University of Maryland, College Park; University of Colorado at Boulder; The University of Texas Southwestern Medical Center at Dallas; University of Southern California; Shanghai Jiao Tong University; Utrecht University; Technical University of Munich; University of California, Santa Barbara; University of Munich; University of Zurich; University of Sydney; University of California, Irvine; University of Geneva; University of Science and Technology of China; The University of New South Wales; Vanderbilt University; University of Groningen; Fudan University; University of Oslo; Aarhus University; Heidelberg University; National University of Singapore; The University of Texas M. D. Anderson cancer center; McGill University; Ghent University; Monash University; University of Bonn; The Hebrew University of Jerusalem; University Paris Citē; Sun Yat-sen University; The Australian National University; University of Bristol; University of Pitssburgh;Purdue University - West Lafayette; Technion-Israel Institute of Technology; University of Basel; Weizmann Institute of Science; Erasmus University Rotterdam; Nanyang Technological University; Uppsala University;			

	McMaster University; Stockholm University; University of Alberta; University of Helsinki; University of Florida; KU Leuven; Huazhong University of Science and Technology; The University of Hong Kong; Seoul National Universty;Brown University; The University of Western Australia;

Table 1 offers a structured depiction of the clustering of universities derived from indicators within the Shanghai University Rankings. Clustering, as a fundamental technique in data analysis, serves the purpose of categorizing entities based on shared characteristics to unveil underlying patterns or relationships. Within the context of this study, clustering aims to discern similarities among universities concerning indicators such as academic reputation, research output, and alumni influence, as reflected in the Shanghai University Rankings.

Cluster 1, characterized by the sole presence of Harvard University, stands out as a distinct profile within the dataset. The absence of within-cluster variance, as denoted by zero values for the within-cluster sum of squares, average distance from centroid, and maximum distance from centroid, suggests a high degree of cohesion and proximity to the centroid. This observation underscores Harvard University's unique position, marked by its unparalleled academic stature and minimal variability compared to other institutions.

In contrast, Cluster 2 comprises seven universities, including prestigious entities like Stanford University, Massachusetts Institute of Technology (MIT), and the University of Cambridge. The notably higher within-cluster sum of squares in Cluster 2 implies increased variability among member universities, indicative of diverse performance profiles. The average distance from the centroid reflects moderate dispersion around the centroid, while the presence of outliers, as indicated by the maximum distance from the centroid, underscores the existence of universities with substantial deviations from the cluster's central tendency.

Cluster 3 emerges as the largest cluster, encompassing 92 universities from diverse geographical regions. Despite its size, Cluster 3 exhibits considerable within-cluster variability, as evidenced by the highest within-cluster sum of squares. Nevertheless, the relatively lower average distance from the centroid suggests a tighter clustering pattern compared to Cluster 2, indicating a more cohesive grouping of universities. However, the presence of outliers with significant deviations from the centroid underscores the heterogeneity within this cluster.

The composition of each cluster sheds light on the types of universities aggregated based on their performance in the Shanghai University Rankings. Cluster 1's exclusive representation by Harvard University reaffirms its global academic eminence and singular standing within the dataset. Cluster 2's inclusion of top-tier institutions underscores a competitive landscape characterized by academic prestige and excellence. Conversely, Cluster 3's diverse composition reflects a broad spectrum of universities from various countries and regions, highlighting the global representation within this cluster.

Table 2Average Values of the Shanghai University Rankings per Cluster

Variable	**Cluster 1**	**Cluster 2**	**Cluster 3**	**Grand centroid**
Rating	100.0	64.7	33.9	36.8
Alumni	100.0	62.7	18.3	22.2
HiCi (Highly Cited Researchers)	100.0	47.5	30.6	32.5
N&S (Nature & Science)	100.0	60.7	29.6	32.4
PUB (Publications)	100.0	57.2	59.6	59.8
Award	96.8	86.2	21.7	26.9
PCB	84.3	67.0	30.8	33.9

The data in Table 2 reveal notable discrepancies in university performance across the identified clusters, as measured by various metrics in the Shanghai University Rankings. A descriptive statistical analysis of the clusters elucidates these differences. Cluster 1 exhibits superior performance, boasting the highest average values

across most metrics. For instance, it maintains a mean rating of 100.0, indicating the highest rank on average among universities in this cluster. This is supported by the mean alumni score of 100.0, reflecting the substantial influence and reputation of alumni associated with these institutions. Additionally, Cluster 1 records an average award score of 96.8, showcasing consistent recognition for academic excellence.

In contrast, Cluster 3 displays comparatively lower average scores across the board. For instance, it registers a mean rating of 33.9, suggesting a lower rank on average compared to Clusters 1 and 2. Similarly, Cluster 3 records the lowest mean alumni score of 18.3, indicating a diminished alumni network influence. Despite these lower averages, Cluster 3 surprisingly outperforms the other clusters in terms of the average publications score (PUB), with a mean value of 59.6. This anomaly warrants further investigation into the underlying factors contributing to heightened publication output within this cluster.

The statistical analysis also highlights the variability within each cluster. For instance, while Cluster 1 demonstrates overall high performance, it exhibits variability in scores, as indicated by standard deviations across metrics. Conversely, Cluster 3, despite its lower average scores, demonstrates less variability, suggesting a more homogeneous performance profile among its constituent universities.

Furthermore, the grand centroid values provide a useful summary measure of overall performance across all clusters. With a grand centroid rating of 36.8, the collective average ranking reflects the composite performance of universities included in the study. Lastly, the statistical analysis underscores the multifaceted nature of university performance captured by the Shanghai University Rankings. These findings contribute to a nuanced understanding of the diverse factors influencing institutional excellence and inform strategic decision-making in academia and higher education policy.

Table 3 Cluster of Universities Based on the Indicators of QS World University Ranking

Cluster	**No.of countries**	**Within cluster sum of squares**	**Average distance from centroid**	**Maximum distance from centroid**
1	48	101157	44.21	77.69
2	27	44007	37.83	88.26
3	25	45982	41.92	69.61
Cluster 1	Massachusetts Institute of Technology (MIT); University of Oxford; Stanford University; University of Cambridge; Harvard University; California Institute of Technology (Caltech); Imperial College London; ETH Zurich - Swiss Federal Institute of Technology; UCL; University of Chicago; National University of Singapore (NUS); Nanyang Technological University, Singapore (NTU); Epilate University of Edinburgh; Columbia University; Princeton University; Cornell University; The University of Hong Kong; Johns Hopkins University; University of Toronto; McGill University; The Australian National University; The University of Manchester; The Hong Kong University of Science and Technology; King's College London; The Chinese University of Hong Kong (CUHK); New York University (NYU); University of British Columbia; Institute Polytechnique de Paris; Technical University of Munich; Carnegie Mellon University; City University of Hong Kong; Brown university; The University of Warwick; University of Bristol; The Hong Kong Polytechnic University; Universidad de Buenos Aires (UBA); University of Glasgow; University of Southampton; Lomonosov Moscow State University; Lund University Royal Institute of Technology; University of Birmingham; University of St Andrews; University of Leeds; Rice university; The University of Sheffield; Technical University of Denmark;			

Cluster 2	University of Pennsylvania; Yale University; Tsinghua University; Peking university; The University of Tokyo; University of Michigan-Ann Arbor; Northwestern University; Fudan University; Kyoto University; Seoul National University;Université PSL;Zhejiang University; Duke University; Tokyo Institute of Technology (Tokyo Tech);Ruprecht-Karls-Universität Heidelberg;Universiti Malaya (UM);University of Zurich; Korea University; Osaka University; University of Wisconsin-Madison; University of Copenhagen; Yonsei University; Pohang University of Science And Technology (POSTECH);Tohoku University;Université Paris-Saclay; Sungkyunkwan University (SKKU); University of Science and Technology of China;
Cluster 3	University of California, Berkeley (UCB);The University of Melbourne; The University of Sydney; University of California, Los Angeles (UCLA);KAIST - Korea Advanced Institute of Science & Technology; The University of New South Wales (UNSW Sydney);The University of Queensland; University of California, San Diego (UCSD);The London School of Economics and Political Science (LSE);Shanghai Jiao Tong University; University of Amsterdam; Delft University of Technology; Monash University; Ludwig-Maximilians-Universität München; University of Texas at Austin; National Taiwan University (NTU);KU Leuven; Sorbonne University; Durham University; University of Illinois at Urbana-Champaign; The University of Auckland; University of Washington; Georgia Institute of Technology; The University of Western Australia; Pennsylvania State University;

The cluster analysis of the QS World University Rankings reveals three distinct groups of universities based on various performance indicators such as academic reputation, employer reputation, faculty/student ratio, and research output. Cluster 1 comprises the most prestigious and globally recognized institutions, including MIT, University of Oxford, Stanford University, and Harvard University. These universities, spread across 48 countries, are characterized by their significant research contributions, strong funding, and global influence. The high within-cluster sum of squares indicates a diverse group in terms of geographic location and institutional focus, yet all maintain top-tier status in the rankings.

On the other hand, Cluster 2 includes highly respected universities that, while slightly less prestigious than those in Cluster 1, still hold substantial regional and global influence. This group, with 27 countries represented, features institutions such as the University of Pennsylvania, Yale University, Tsinghua University, and The University of Tokyo. These universities exhibit strong academic and research capabilities and are known for their rising prominence in global education, particularly institutions from Asia. The lower within-cluster sum of squares compared to Cluster 1 suggests a more homogeneous grouping with similar high performance across various indicators.

Finally, Cluster 3 consists of universities that are highly ranked but more varied in their strengths and often have a strong regional presence. Notable institutions in this cluster include the University of California, Berkeley, The University of Melbourne, The University of Sydney, and UCLA. Representing 25 countries, these universities excel in specific areas such as technology, social sciences, or regional studies, and many are flagship public universities with large student populations. The metrics for this cluster, such as within-cluster sum of squares and distances from the centroid, indicate moderate variability, reflecting the diverse specialties and institutional profiles within this group.

Table 4 Average Values of the QS World University Ranking per Cluster

Variable	**Cluster 1**	**Cluster 2**	**Cluster 3**	**Grand centroid**
Academic Reputation	82.23	79.83	84.88	82.25
Employer Reputation	80.39	80.39	78.22	79.85

Faculty Student	79.43	91.47	30.49	70.44
Citations per Faculty	73.29	62.26	85.96	73.48
International Students	88.17	37.87	64.72	68.73
Overall	80.49	74.73	71.72	76.74

The average values of the QS World University Ranking indicators provide insight into the distinct characteristics of each cluster. Cluster 1 universities exhibit high scores across all indicators, particularly in Academic Reputation (82.23) and Employer Reputation (80.39), reflecting their global prestige and strong marketability of graduates. They also score well in Citations per Faculty (73.29) and have a very high International Students percentage (88.17), indicating their significant international appeal and research impact. Cluster 1's score is 80.49, which is well above the grand centroid of 76.74, highlighting their top-tier status.

Meanwhile, Cluster 2 shows slightly lower scores than Cluster 1 but still maintains strong performance. Academic Reputation (79.83) and Employer Reputation (80.39) are robust, signifying respected academic programs and graduate employability. However, Faculty Student ratio is notably higher (91.47), suggesting a greater emphasis on smaller class sizes and personalized education. Citations per Faculty (62.26) are lower, indicating less research impact compared to Cluster 1. The International Students percentage is significantly lower (37.87), reflecting a more regional student body. The overall score for Cluster 2 is 74.73, close to the grand centroid, showing a balanced yet less globally dominant profile.

Cluster 3 has varied strengths, with the highest Academic Reputation (84.88) and Citations per Faculty (85.96), indicating excellence in research output and academic prestige. However, the Employer Reputation (78.22) is slightly lower, and the Faculty Student ratio (30.49) is significantly lower, possibly indicating larger class sizes and less personalized education. The International Students percentage (64.72) is moderate, suggesting a fair level of global attraction. The overall score of 71.72 is below the grand centroid, signifying strong academic and research capabilities but less balance across all indicators compared to Clusters 1 and 2.

The analysis highlights that Cluster 1 universities excel in prestige, research impact, and international appeal, Cluster 2 institutions focus on personalized education with strong regional influence, and Cluster 3 universities shine in academic and research areas but vary more widely in other indicators. These distinctions underscore the diverse strengths and profiles of universities within each cluster.

On the other hand, Table 5 reflects the cluster analysis of the THE World University rankings.

Table 5 Cluster of Universities Based on the Indicators of THE Ranking

Cluster	**No. of countries**	**Within cluster sum of squares**	**Average distance from centroid**	**Maximum distance from centroid**
1	31	23549.2	26.1	48.7
2	59	47612.1	27.2	47.0
3	9	3119.9	17.3	29.0
Cluster 1	University of Oxford (United Kingdom);Harvard University(United States);University of Cambridge (United Kingdom);Stanford University (United States);Massachusetts Institute of Technology (United States);California Institute of Technology (United States);Princeton University (United States);University of California Berkeley (United States);Yale University (United States);Imperial College London (United Kingdom);Columbia University (United States);ETH Zurich (Switzerland);Chicago (United States);University of Pennsylvania (United States);Johns Hopkins University (United States);Tsinghua University (China); Peking University (China);University of Toronto (Canada);National University of Singapore (Singapore);Cornell University (United States); University of California, Los Angeles (United			

	States); UCL (United Kingdom);University of Michigan-Ann Arbor (United States);New York University (United States);Duke University (United States);Northwestern University (United States);University of Washington (United States);Technical University of Munich (Germany);University of California , San Diego (United States);LMU Munich (Germany);KU Leuven (Belgium);
Cluster 2	Carnegle Mellon University (United States);University of Edinburgh (United Kingdom);University of Hong Kong (Hong Kong);University of Melbourne (Australia);King's College London (United States); Nanyang Technological University, Singapore (Singapore);London School of Economics and Optical Science (United Kingdom); Georgia Institute of Technology (United States);University of British Columbia (Canada);Ecole Polytechnique Federal de Lausanne (Switzerland);Universitas Heidelberg (Germany);Monash University (Australia);Chinese University of Hong Kong (Hong Kong);Mcgill University (Canada);Paris Sciences et Lettres -PSL Research University Paris (France);University of Illinois at Urbana-Champaign (United States);Karolinska Institute (Sweden);University of Texas at Austin (United States);Fudan University (China);The University of Queensland (Australia);University of Manchester (United Kingdom);The University of Sydney (Australia);Washington University in St Louis (United States);The Hong Kong University of Science and Technology (Hong Kong);Wageningen University & Research (Netherlands);University of Amsterdam (Netherlands);Brown University (United States);Australian National University (Australia);University of California, Davis (United States);University of California, Santa Barbara (United States);University of Southern California (United States);Utrecht University (Netherlands);University of North Carolina at Chapel Hill (United States);Delft University of Technology (Netherlands);Boston University (United States);UNSW Sydney (Australia);Charite-Universitatsmedizin Berlin (Germany);University of Science and Technology of China (China); University of Groningen (Netherlands); University of Bristol (United Kingdom); Leiden University (Netherlands); Hong Kong Polytechnic University (Hong Kong); Erasmus University Rotterdam (Netherlands); university of Wisconsin-Madison (United States); Emory University (United States); University of Glasgow (United Kingdom); University of Zurich (Switzerland); McMaster University (Canada); Humboldt University of Berlin (Germany); University of Tubingen (Germany); University of Adelaide (Australia); University of Bonn (Germanay); Sorbonne University (France); Free University of Berlin (Germany); University Paris-Sac lay (France); University of Bern (Switzerland); Institute Polytechnique de Paris (France); Vanderbilt University (United States); City University of Hong Kong (Hong Kong);
Cluster 3	The University of Tokyo (Japan); Shanghai Jiao Tong University (China); Seoul National University (South Korea); Zhejiang University (China); Kyoto University (Japan); Yonsel University Seoul Cmpus (South Korea); Korea Advanced Institute of Science and Technology (South Korea); Nanjing University (China); RWTH Aachen University (Germany);

On the other hand, the cluster analysis of the Times Higher Education (THE) world ranking divides universities into three distinct clusters based on various indicators used in the ranking. This analysis provides insights into the similarities and differences among the world's leading universities.

Cluster 1 consists of 31 universities from 10 countries, including many of the most prestigious institutions globally, such as the University of Oxford, Harvard University, and Stanford University. The universities in this cluster are characterized by very high academic and research performance. The within-cluster sum of squares for this group is 23,549.2, indicating a relatively tight grouping around the cluster centroid. The average distance from the centroid is 26.1, and the maximum distance is 48.7, suggesting that while there is some variability

within the cluster, the universities are generally similar in terms of their ranking indicators. This cluster includes several Ivy League schools, top UK institutions, and leading universities from China, Canada, and Europe, reflecting a concentration of high-caliber institutions in terms of research output, academic reputation, and overall global influence.

Cluster 2 includes a larger and more diverse set of 59 universities from 18 countries. Institutions in this cluster, such as Carnegie Mellon University, University of Edinburgh, and University of Hong Kong, are also highly regarded but generally do not reach the same pinnacle of performance as those in Cluster 1. The within-cluster sum of squares is 47,612.1, indicating more variability within this group compared to Cluster 1. The average distance from the centroid is slightly higher at 27.2, with a maximum distance of 47.0. This larger cluster reflects a broader range of performance and a more diverse geographical distribution, including significant representation from the United States, Europe, Asia, and Australia. These universities are known for strong research capabilities and academic programs, though they may have a wider range in terms of specific performance metrics.

Cluster 3 is the smallest, comprising 9 universities from 4 countries, primarily located in East Asia, including the University of Tokyo, Shanghai Jiao Tong University, and Seoul National University. This cluster has a within-cluster sum of squares of 3,119.9, indicating the tightest grouping among the three clusters. The average distance from the centroid is 17.3, and the maximum distance is 29.0, reflecting a very homogeneous group in terms of the indicators used in the ranking. The universities in this cluster are noted for their strong regional influence and robust academic and research standards, which are comparable to those in Cluster 2 but with even less variability among them. This cluster highlights the prominence of East Asian institutions in the global higher education landscape.

The cluster analysis reveals a clear stratification among the world's top universities, with Cluster 1 representing the elite institutions with the highest performance across various indicators, Cluster 2 encompassing a larger and more varied group of high-performing universities, and Cluster 3 focusing on a compact group of top East Asian universities. The differences in the within-cluster sums of squares, average distances, and maximum distances from centroids underscore the varying levels of homogeneity and performance within each cluster.

Table 6 Average Values of the THE Rankings per Cluster

Variable	**Cluster 1**	**Cluster 2**	**Cluster 3**	**Grand centroid**
Teaching	81.63	55.55	70.01	65.03
Research	89.50	63.33	73.56	72.45
Citations	94.99	87.84	63.12	87.83
Industry	71.59	61.82	94.20	67.82
International Outlook	77.52	80.15	47.76	76.38
Overall	87.44	69.23	67.94	74.82

The average values of the The Rankings for each cluster as presented in Table 6 reveal distinct profiles and strengths, highlighting the differentiated nature of universities globally and the implications for stakeholders.

For cluster 1, which includes top-tier institutions like Oxford, Harvard, and MIT, boasts the highest average scores in teaching (81.63), research (89.50), and citations (94.99). These universities also have strong industry income (71.59) and a robust international outlook (77.52), indicating their comprehensive excellence and global appeal. The overall score of 87.44 reflects their dominance across all key indicators. The implications are significant for students, researchers, and policymakers. Students aiming for a world-class education might prioritize these institutions for their exceptional academic environments and opportunities. Researchers could find unparalleled resources and collaboration prospects. Policymakers and educational leaders could look to these universities as benchmarks for excellence and innovation in higher education.

Meanwhile, cluster 2 includes a diverse set of 59 universities such as Carnegie Mellon, University of Edinburgh, and University of Hong Kong. These institutions have solid performance in teaching (55.55) and research (63.33), and high citations (87.84), indicating strong research influence. Their industry income (61.82) and international outlook (80.15) also suggest substantial engagement with industry and a globally diverse academic community. The overall score of 69.23 points to well-rounded, high-quality institutions. The implications for stakeholders include a wide range of options for students seeking quality education with international exposure. These universities are likely attractive for industry partnerships and collaborative research due to their balanced performance and global networks.

Finally, cluster 3, consisting of universities like the University of Tokyo, Shanghai Jiao Tong University, and Seoul National University, shows high teaching scores (70.01) and strong research capabilities (73.56). However, they have lower citation scores (63.12) compared to the other clusters, reflecting regional research impact that may not yet match global peers. Their industry income is the highest (94.20), highlighting significant engagement with industrial sectors. The international outlook score is lower (47.76), indicating less global diversity. The overall score of 67.94 suggests robust regional prominence with specific strengths. For stakeholders, these universities represent key hubs of innovation and industry collaboration in East Asia. They are attractive for local students and companies, while international students and researchers might find unique opportunities in these rapidly advancing regions.

Best Fit Model

The results in Table 7 summarize the outcomes of a stepwise regression analysis conducted to determine the best fit model for higher education institutions in the Philippines aiming to be included in global university rankings. The analysis considered three models with different combinations of predictors.

Table 7Summary of the Three Models

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.898[a]	.806	.804	5.91737
2	.922[b]	.850	.847	5.22581
3	.929[c]	.864	.859	5.01041

a. Predictors: (Constant), THE

b. Predictors: (Constant), THE, Shanghai

c. Predictors: (Constant), THE, Shanghai, QS

Model 1, which uses the Times Higher Education (THE) ranking as the sole predictor, shows a high correlation coefficient (R) of 0.898 and an R Square value of 0.806. This indicates that 80.6% of the variance in the dependent variable is explained by the THE ranking alone, with a standard error of the estimate of 5.91737.

This high explanatory power suggests that the THE ranking is highly influential and reliable in predicting the performance or status of higher education institutions in the context being studied. However, while substantial, there is still 19.4% of the variance unexplained, indicating room for additional factors to improve the model's accuracy.

Meanwhile, Model 2 includes both the THE and Shanghai rankings as predictors, resulting in an increased R value of 0.922 and an R Square of 0.850. This means that 85% of the variance is now accounted for, showing a significant improvement in the model's explanatory power. The adjusted R Square, which accounts for the

number of predictors in the model, is slightly lower at 0.847. The standard error of the estimate decreases to 5.22581, indicating a more precise model.

Lastly, Model 3 incorporates the The, Shanghai, and QS rankings as predictors. This model exhibits the highest R value of 0.929 and an R Square of 0.864, meaning 86.4% of the variance in the dependent variable is explained by these three rankings combined. The adjusted R Square is 0.859, reflecting the slight penalty for the additional predictor. The standard error of the estimate further decreases to 5.01041, suggesting that this model provides the most accurate predictions among the three.

Based on the results, Model 3 suggests that universities aiming to be included in world university rankings should focus on improving their performance across the key metrics commonly used by the Times Higher Education (THE), Shanghai, and QS rankings, which include academic reputation and research. Addressing factors such as research output and quality, teaching excellence, and international collaboration, can help universities enhance their overall standing. Specifically, this means investing in high-quality research, publishing in reputable journals, upgrading teaching methods, fostering international partnerships, and increasing the presence of international students and staff. These combined efforts are likely to yield the most accurate and comprehensive improvements, as indicated by the model's high explanatory power and precision.

Furthermore, the results of the models also showed a very high VIF (1.658, 2.053, and 1.674) which is a sign of multicollinearity. Multicollinearity in regression analysis occurs when two or more predictor variables are highly correlated to each other, such that they do not provide unique or independent information in the regression model. If the degree of correlation is high enough between variables, it can cause problems when fitting and interpreting the regression model. In this case, the values are between 1 and 5 which indicate moderate correlation between the given predictor variable and other predictor variables in the models.

CONCLUSIONS

The clustering analyses illustrate the complexity of university performance and the diverse factors that contribute to institutional rankings. Each ranking system provides a different lens through which to view and understand the global landscape of higher education.

Universities in the Philippines can significantly enhance their global competitiveness by addressing common key metrics, such as academic reputation, research output, teaching quality, and international collaboration. Model 3 offers a valuable strategic tool for higher education institutions aiming to improve their rankings and align with global standards, providing a data-driven approach for targeted enhancements.

Universities should prioritize enhancing their performance in areas evaluated by these rankings—such as research output, teaching quality, and international collaboration—to achieve significant improvements in their global standing. Focusing on these key metrics allows institutions to gain valuable insights from the model, helping them craft effective strategies to boost their rankings.

REFERENCES

1. Britannica, T. Editors of Encyclopaedia (2023, June 22). higher education. Encyclopedia Britannica.
2. Dembereldorj, Z. (2018). Review on the impact of world higher education rankings: Institutional competitive competence and institutional competence. International Journal of Higher Education, 7(3), 25-32.
3. Hauptman, K.M. (2019). Global university rankings and their impact on the internationalization of higher education. European Journal of Education, 54(4), 557-568.
4. Hazelkorn, E. (2015). Rankings and the reshaping of higher education: The battle for world-class excellence (2nd ed). Palgrave Macmillan: USA.
5. Hewitt, W.A. (2021). Factors affecting competitiveness in university ranking exercises: Lessons from Brazil. Journal of Comparative & International Higher Education, 13(2), 23-37.
6. Istvan, L., Darabos, E., & Orsolya, N. T. (2016). Competitiveness - higher education. Studia Universitatis Vasile Goldis Arad Economics, 26(1).

7. Khan, H., Mohammad Shah, K. A., Khalid, J., Harnam, M. A. A., & Ali, A. J. (2020). Globalization and university rankings: Consequences and prospects. International Journal of Higher Education, 9(6), 190-201.
8. Kireeva, N., Slepenkova, E., Shipunova, T., Iskandaryan, R. (2018). Competitiveness of higher education institutions and academic entrepreneurship. Revista Espacios, 39(23), p.15-37.
9. Laura, L. (2023). QS world university rankings methodology: Using rankings to start your university search. Retrieved from www.topuniversities.com/qs-world-university-rankings/methodology
10. Lombardi, R., Lardo, A., Cuozzo, B., Trequattrini, R. (2017). Emerging trends in entrepreneurial universities within Mediterranean regions: An international comparison. EuroMed Journal of Business, 12(2), p. 130-145.
11. Pavel, A. P. (2015). Global university rankings: A comparative analysis. Procedia Economic and Finance, 26, 54-63.
12. Sanikova, I., Prikhodko, A., & Muhitdinov, A. (2021). Assessment of the university's impact on global competitiveness based on rankings. Web of Conferences, 296, 08009.