Article

University Rankings and Goals: A Cluster Analysis

Roba Elbawab

BRU-IUL, Instituto Universitário de Lisboa (ISCTE-IUL), Avenida das Forças Armadas, Edificio ISCTE, 1649-026 Lisbon, Portugal; rrebe@iscte-iul.pt

Abstract: Nowadays, university rankings are used to assess all aspects of universities. Due to the impact of university rankings on assessing the performance of universities, this research aims to explore university rankings in depth. University rankings are considered contributors to assessing university performance. Previous literature showed different types of goals, such as output and support goals, where the literature advised to align between these two types of goals. Universities have different goals, but still, university rankings measure all universities on the same criteria. Subsequently, this research has used the most used university rankings in the literature, QS world ranking dataset. Then unsupervised machine learning was performed to cluster the universities. The results divided universities among four clusters. This study helps in allocating the university in the adequate cluster. This study helps university managers define the goals of their universities. The study recommends universities align their support goals with their output goals. The study recommends universities to develop international goals and strategies, and support the research in the universities by supporting the scholars. This study's novelty lies in connecting the university rankings and goals using management analytics in education.

Keywords: higher education institutions; university rankings; university goals; cluster analysis; management analytics

1. Introduction

University rankings have shown a significant contribution to the universities' decision-making (Hosier and Hoolash 2017). Universities' rankings have become the dominant measure of higher education institutions' performance (Ordorika and Lloyd 2015). University rankings were developed at the beginning of the 20th century and were published every 5 years (Hazelkorn 2011; Bugaj and Rybkowski 2018). The rankings were first developed to compare the scholarly power of American universities by assessing the research reputation of their academics (Bugaj and Rybkowski 2018). Nowadays, University rankings are used to assess universities internationally (Belov et al. 2018). Moreover, University rankings are used to assess the university as a whole rather than the research reputation solely. The study developed by (Hosier and Hoolash 2017) mentioned that decision-making in higher education institutions that are developed upon the league tables included several decision-makers from different levels in the higher education institutions. Moreover, in the previous literature, it is claimed that league tables are involved in the creation of decisions by several higher education institutions' stakeholders (Hosier and Hoolash 2017).

Hazelkorn (2007) criticized university rankings as mentioning they are primitive and inappropriate for higher education institutions, whereas the university rankings mainly focus on research and reputation, where universities are pushed to increase their ranking. Tofallis (2012) also criticized the rankings of universities as they used an additive approach, where the various normalization techniques would lead to different results when applied to the same data. Tofallis (2012) advised that it is important not only to point out the weakness but to suggest ways to improve; hence, Tofallis (2012) proposed a multiplicative approach to aggregate the data and overcome the ranking differences. On the other hand, Hubbard et al. (2021) mentioned that even though university rankings are criticized in both their rationale

and methodology, still the rankings are considered by university managers. The university ranking goal is to show the top university ranking. The famous university rankings are the QS World University Ranking, The Times higher education world university ranking, the Academic Ranking of World Universities, The US News & World Report Best Global University Rankings, and the National Taiwan University Ranking (Shehatta and Mahmood 2016). The QS-WUR and the other five major university rankings mentioned earlier show moderate-to-high internal correlations among them regardless of their methodological differences (Shehatta and Mahmood 2016; Cortés et al. 2022). The importance of university rankings has even been extended to the decision makers of public funding, such as research grants, laboratories, and researchers, where these decision-makers consider university rankings when funding decisions are made (Cortés et al. 2022). One of the factors that increased the importance of having rankings is the demand of the students and their families to collect more information about the university that they will invest in for the future; enrolling in a university is a long-term expensive investment that students and their families are committed to it (Dill and Soo 2005). The rankings influence the prestige of the university, in case of increasing or decreasing ranking. Accordingly, some universities use their rank as a marketing tool to promote the university to students and staff. Furthermore, the university's position and international ranking promote universities to receive more international students (Hazelkorn 2007; Hosier and Hoolash 2017).

The position of the university in the rankings is even a core goal for the higher education institutions' management team (Hazelkorn 2009; Hubbard et al. 2021). Subsequently, university managers are considering university rankings when developing their decisions. Universities such as other types of organizations face changes, whereas university managers have to adapt to the changes that they face (James and Derrick 2020). Therefore, university authorities more and more often decide to use management tools, such as strategic or macroeconomic analyses that might be successfully applied in other organizations (Bugaj and Rybkowski 2018). Part of the strategic analysis is setting the university goals by university managers. Whereas attaining a better University ranking is one of the ongoing goals for universities. Since the rising importance of the university rankings, university managers are committed to securing their relevant universities in the ranking list annually. Other university managers target a better position in the ranking list. Subsequently, each university set its ranking goal based on its current annual ranking and revisits the ranking goal to assess the need for development. In 1969, Gross proposed that there are different goals for organizations and also different intentions for the goals. Gross has developed his study specifically on universities, where he advised that goals are divided into two different kinds and are known as output goals and support goals. Output goals are described as the goals that reflect the output and support goals are described as goals at the ends of those goals who are charged with the responsibility for the maintenance activities. Intentions of the goals on the other side describe the view and perception of the managers in the organization as what they believe the organizational goals to be, and what direction the organization will tackle, whereas activities focus on what the person in the organization is actually doing and how resources are being allocated. Hence, it is important to distinguish between intentions, activities and outputs (Gross 1969).

Daft (2010) argues that organizations have different types of goals. These organizational goals are official goals and operative goals. The official goals mainly focus on the overall goal of the organization. An example of the official goals is the mission, vision and strategic plan, whereas the operative goal is described as the operative goal helping to reach the end goal through the actual operating procedures. It is highlighted those operative goals are the goals that show what the organization is actually trying to do. Operative goals are developed for the short run with measurable outcomes. Examples of the operative goals include resources goals, performance goals, market goals, productivity goals, innovation goals and employee development goals (Daft 2010).

Daft's definition of the official goals aligns with Gross's suggestion of output goals, as both concentrates on the ends. Daft and Gross also agree that support goals that are

proposed by Gross, and operative goals defined by Daft help in supporting the official and output goals. Accordingly, this research emphasizes the similarity between official and output goals and also between support and operative goals. Whether an organization or a special type of organization such as a university, an official goal should be assigned, and subsequently operative goals should also be identified. In this research, we will refer to the goals as output and support goals.

Universities as a type of organization are known as complex organizations (Damrosch 1995; Bleiklie and Kogan 2007). Pinheiro and Young (2017, p. 120) stated that "Complex systems are nonlinear, dynamic and are characterized by many sub-entities and multiple connections or linkages between them (Morçöl 2012), and thus describe well the university and its environment". Throughout the years, and with the change that is happening and the competitiveness in the market (Dill and Soo 2005), universities needed to adapt. As teaching and basic research are no longer the only university goals (Adamakou et al. 2021) but internationalization (Soliman et al. 2019; James and Derrick 2020), higher ranking (Tee 2015), better teaching and learning activities (Alzafari and Ursin 2019), and others, are also considered university goals. Hence, the creation of university goals is always challenging. The university managers need to define the output goal and then build the support goals that would include the activities that would finally attain the output goal. University managers also need to consider different faculties with the included departments when creating these goals.

Neo-liberal theory developed higher education institution policymaking in the whole world (Dougherty and Natow 2020). Universities whether public or private are encouraged to have new customers and to look for new streams of revenue (Cantwell and Kauppinen 2014; Teixeira and Dill 2011; Dougherty and Natow 2020). Moreover, strong accountability pressures are imposed on the public university, like intrusive audits, extensive data reporting & funding other bases of performance (Stensaker and Harvey 2011). Performance based funding for higher education institutions in the USA, Canada, Australia, Europe, and other contexts is a clear practice of neoliberal policy making (Broucker and de Wit 2015; Ferlie et al. 2008; Lane and Kivisto 2008; Dougherty and Natow 2020). Neoliberal theory shows a variety of theories like new public administration, new managerialism, principal agent theory and performance management (Bleiklie 1998; Broucker and de Wit 2015; Lane and Kivisto 2008; Dougherty and Natow 2020). The common factors between these theories are the economics of organization, in the form of public-choice theory, and transaction cost theory. Accordingly, neo-liberal theories are described as "the role of self-interested individuals and organizations and the role of material incentives in motivating them" (Dougherty and Natow 2020, p. 458).

In higher education institution, previous scholars showed that there are supporters and opposers to public based funding, the supporters think that it helps universities to improve higher education institution outcomes in efficiency and effectiveness (Dougherty and Natow 2015; Li 2017; Ness et al. 2015; Rabovsky 2014). Furthermore, scholars found in Europe, the supporter of public based funding is mainly because it influences university accountability (Frølich 2011). University accountability includes the university mission and the university goals, whereas scholars added that highlighting favorable performance indicators (ex: League tables and rankings) helps the university to strengthen its case for asking for more funding from the government (Dougherty and Natow 2015; Frølich 2011; Frølich et al. 2010; Rabovsky 2014; Dougherty and Natow 2020).

On the other hand, obstacles that are ignored by public based funding, are lack of organizational resources, unstable funding and a poor fit between public based funding indicators and the organization's mission (Dougherty and Natow 2020). Subsequently, organizational goals are going to be affected as they are related to the organizational mission. Institution response to public based funding is also affected, whereas performance indicators change frequently, and institutions no longer know how much to expect as funding (Dougherty and Natow 2020). Accordingly, higher education institution performance will

look poor according to the government standards but not according to institution standards (ex: Frølich et al. 2010; Guthrie and Neumann 2007).

Since one of the university goals is university ranking, in addition to the neoliberal approach of increasing university ranking, the research will focus on developing a deep understanding of the rankings from a university goal perspective. The ranking structure assesses universities on several criteria, and these criteria are applied to all universities equally. However, since universities have different output and support goals, the university ranking would be inadequate in describing the status of the university as the different university goals are not taken into consideration. The metric system that is used to rank universities fails to capture the full range of university productivity (Van Raan 2005; Pérez-Esparrells and Orduna-Malea 2018). Hence, universities shouldn't be assessed only on the overall score. Accordingly, universities shouldn't set university ranking as the main goal, as it is not considered a feasible goal. Therefore, we need to assess universities based on their respective goals. Some questions were raised by the author of this paper from the previous literature, such as "Could we show university ranking from a different perspective other than the overall score?", "Could the universities be divided into clusters?" and "How many university clusters can be identified?"

Some researchers clustered universities from a theoretical perspective like Belov et al. (2018). Other researchers classified research universities as top and moderate research activity in Indian universities but did not include all types of universities (Jalote et al. 2020). Other scholars applied the cluster analysis using artificial intelligence to 137 technical universities using the Times Higher Education data set in 2018 (Pérez-Esparrells and Orduna-Malea 2018). However, this research will use artificial intelligence to help analyse the university rankings of all universities included in QS university rankings and to connect them with the different university variables. The research will use unsupervised classification known as data clustering. In a study developed by Bugaj and Rybkowski (2018), university strategy with assessment indicators of international university ranking was assessed. However, this study will focus on assessing university goals with the different university clusters generated from the university rankings. We will focus on clustering the universities according to the different criteria of the rankings and explore these developed clusters.

The novelty of this research is highlighting the importance of the relationship between goal setting and university rankings. Furthermore, classifying universities into clusters using unsupervised machine learning classification is considered a novel way to classify universities. Finally, this research contributes to management education and management analytics studies by matching the university goals with the university's performance. As this research will help in better defining the university performance as university rankings in a novel way that mainly focuses on the achievements of the universities.

The remainder of this paper is organized as follows. Section 2 describes the data and the methodology used. Section 3 shows the results and the discussion. Section 4 is devoted to the main conclusions and implications.

2. Methodology

The data used for this study is the ranking of universities for the year 2022 with the six ranking indicators. The data are obtained from the official website of the QS university ranking for the relevant year. The data can be downloaded on the respective website (QS World University Ranking 2022). The ranking indicators used in QS university rankings and also used in this study are international student ratio, international faculty ratio, faculty-student ratio, citations per faculty, academic reputation, and employer reputation. The academic reputation score and employer reputation score metrics are assessed using surveys, hence these metrics are based on perceptions of the academics and employers. The other four metrics are based on numerical data. The citation per faculty score may be affected by universities publishing in languages other than English (Locke et al. 2008; Ordorika and Lloyd 2015). The QS world ranking was selected as it is one of the most-

discussed rankings in recent literature (Cortés et al. 2022). An explanation of the ranking indicators is found in Table 1.

Table 1. Ranking Indicators and their explanation by (QS World University Ranking 2022).

Ranking Indicator	Explanation
International student ratio	This indicator calculates the ratio of international students to overall students.
International Faculty ratio	This indicator calculates the ratio of international faculty staff to overall staff.
Faculty-student ratio	This indicator is calculated by dividing the number of students validated by QS by the Faculty figure validated by QS.
Citations per faculty	The indicator is calculated by citation count for six years for papers published over five years.
Academic reputation	The results of this indicator are based on the responses to a survey distributed to worldwide academics with a different number of sources.
Employer reputation	The results of this indicators are based on the responses to a survey distributed to worldwide employers with a different number of sources.

Clustering helps in classifying the patterns of data, observations or feature vectors into groups or clusters (Jain et al. 1999). The overall goal of clustering is to group objects into clusters based only on their observable vectors, hence each cluster will contain objects with similar properties and different clusters that have distinct features (Bertsimas et al. 2021). In this study, we will use clustering algorithms to group universities into different clusters. Gaussian Mixture Model (GMM) belongs to the class of model-based clustering or distribution models. A mixture model describes a dataset by combining a mix of two or more probability distributions. One of the benefits of the mixture model is using soft clustering, where it fits a set of probabilistic models to the data. GMM uses an expected maximization (EM) algorithm to estimate the model components and the appropriate number of clusters. Subsequently, cases are assigned to the cluster of the distribution under which they are most likely (Rhys 2020). In this study GMM clustering is used, GMM helps in identifying ellipsoidal-shaped clusters when the cluster is modelled as a Gaussian distribution. GMM also provides a better quantitative measure of fitness per number of clusters (Patel and Kushwaha 2020).

Regarding this study, cluster analysis is applied to the ranking indicators of the universities that were mentioned above to generate the different university clusters. Then we will analyze the generated clusters to better understand the classifications of the universities rather than just to rely on the rankings of QS world ranking.

Data analysis is performed using Python using Pandas package (McKinney 2010). After data are downloaded, transformations were applied to the data in order to correct the detected quality issues and prepare the modelling of the data. The following actions were applied: removal of observations with missing values. Then the correlation between the ranking indicators was performed. We have found a high correlation between academic reputation score and employer reputation score. Another correlation is found between international faculty score and international student score. Hence, employer reputation score and international faculty score variables were removed. Moreover, data were normalized in this research in the range of (0,1) using the mean max scaler method. Since the dataset is associated with a distribution that is a mixture of two or more clusters and the benefits of GMM which is accompanied by the normalization of the dataset, this study will use GMM in clustering the data.

3. Results

The dataset used for this study is the QS world ranking for universities in 2022. The dataset shows the six different metrics used in university ranking. These metrics are used to assign scores for the universities, and they are considered an output from the universities, these outputs are considered performance indicators and they are eventually considered a reflection of the university goals.

An initial summary of the statistics of the data including the count, mean, standard deviation, minimum, maximum, 25%, 50%, and 75% are shown in Table 2.

Table 2. Dataset summary statistics (Count, Mean, Standard deviation, Minimum, Maximum).

	Count	Mean	std	min	25%	50%	75%	Max
Academic_reputation_score	1300	21.5525	23.3156	1	6.2	11.9	25.925	100
Employer_reputation_score	1300	22.193	24.5359	1	5.1	11.95	29.625	100
Faculty_student_score	1299	31.9073	28.5644	1	9.4	20.6	47.95	100
Citation_per_Faculty_score	1300	26.2933	28.299	1	3.4	13.4	43.4	100
International_faculty_score	1228	26.5037	35.4295	1	1.7	5.4	44.425	100
International_student_score	1275	28.1191	31.2116	1	3.75	13.2	44.45	100

GMM clustering was performed. The elbow method was used to determine the optimum number of clusters when using Akaike's Information criteria (AIC) and Bayesian information criteria (BIC) (Chen et al. 2017), hence 4 clusters were identified as depicted in Figure 1.
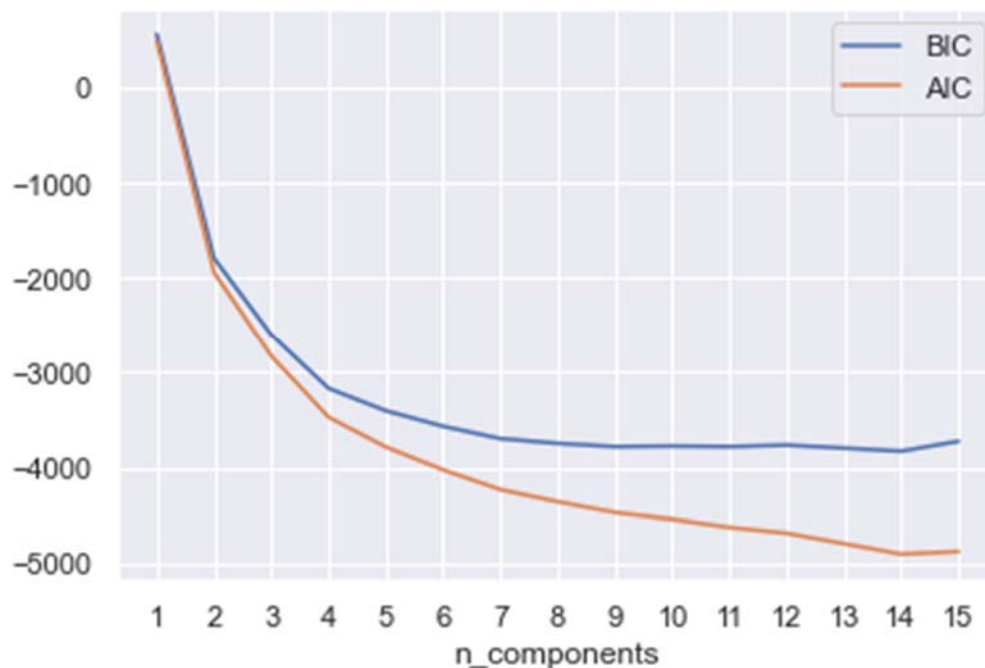

Figure 1. AIC and BIC parameters are used to determine the number of clusters.

Four clusters were identified dividing the universities among these clusters. Table 3 shows the means of variables for each cluster.

Table 3. Means of the variables per cluster.

Cluster	Academic_Reputation_Score (Mean)	Faculty_Student_Score (Mean)	Citation_Per_Faculty_Score (Mean)	International_Student_Score (Mean)
1	0.100	0.114	**0.315**	0.075
2	0.0829	0.174	0.019	0.018
3	0.090	**0.453**	0.065	**0.353**
4	**0.431**	**0.422**	**0.496**	**0.492**

In this study, we decided to analyze mainly the scores of the university that are provided by the QS World University Ranking. So, we decided to include only the scores and not including the ranking of the university as an input in the development and the analysis of this study. Accordingly, the cluster analysis that has been developed in this paper shows how the scores given to each university have allocated the university to a unique cluster that is represented by a specific and unique criterion.

Furthermore, the results show a new way of classifying universities using secondary data as QS World University Ranking, where the general ranking of universities is no longer the only method of defining the performance of the universities; each cluster represents universities in a different approach rather than its designated ranking in the league table. These results show a more into depth analysis of the scores provided in the QS league table. Where we can't equally assess universities when the clusters show otherwise. Cluster analysis helped in showing that by using the annual scores provided by QS, universities are no longer related to one cluster. However, they were designated among four unique clusters, which means their activities and development over the year have led them to this cluster. From a neoliberal perspective, this new representation would help in showing universities with different outputs rather that just the overall ranking. Hence the neoliberalism theory focuses on the efficiency and effectiveness of universities being improved by addressing the cluster analysis.

The first cluster is the cluster that has universities that scored high in citation per faculty. It includes 270 universities (Check Table A1). According to this cluster universities that mainly focus on research and its outcomes as published work are the universities that are found in this cluster. Moreover, this cluster highlights the universities whose main goal is to have more citations for each researcher. These universities practically promote research by having supportive learning culture for their research staff to transfer the knowledge to have more publications as research outcomes (Islam 2019). When the researcher of this study compared the cluster in relevance to the rankings of the universities, the results showed that the cluster isn't related to the rankings of the universities, whereas the cluster included 240 universities that ranged in the ranking from 255 to 1201. These findings advise fund managers from organizations and governments to direct the funding support to universities in this cluster, as this cluster shows high quality research produced by universities that mainly focus on research development and high-quality research outputs. This study also advises students and scholars, whose main focus is to be researchers, to join the universities in this cluster. Scholars would benefit from the publications and subsequently citations as this would help in receiving recognition, promotions and esteem from the academic community. Universities focus on academic publications and citations as it helps in gaining more opportunities as funding and opportunities for future research (Gu and Blackmore 2019; Fox 1983; Sullivan 1996).

The second cluster is the cluster where the group of universities aren't having a significant collaboration in the tested variables. The number of universities that are found in this cluster is 262 (see Table A1). Moreover, when the cluster is compared to the rankings, these universities lay in the rankings from 445 to 1201. The cluster results show a low contribution of the universities in this cluster to all variables, where this study recommends to these universities align between their goals and their actions.

The third cluster is the cluster with universities that excel in both faculty student scores and international student scores. In total, 297 universities in this cluster focused on both faculty student scores and international student scores (see Table A1). These universities' main goal is to increase the quality of teaching by having less teaching burden on the teachers and attracting international students. When comparing the rankings to this cluster, the results showed that universities ranged from 250 to 1201. The results show that these universities capitalized mainly on being international universities to attract international students and provide high quality education to support students for the international market. Internationalization is a reflection of the globalization of the labor markets and economies (James and Derrick 2020; Qiang 2003). This study recommends that teaching staff that are more focused on teaching to target working in the universities in this cluster, and students that are interested in enrolling in international universities target universities in this cluster. Internationalization helps in widening the transformation of higher education institutions, as it helps to manage the change in the environment (James and Derrick 2020). Internationalization also has increasing importance in universities as a concept and as a set of activities (Soliman et al. 2019). Hence, Universities in the third cluster are adapting to the change by working on internationalization as shown by this study's results.

The fourth cluster is the cluster with universities that have shown contribution in all variables like academic reputation score, faculty student score, citation faculty score and international student score. This cluster includes 445 universities (see Table A1). When comparing the rankings to this cluster, the results showed that universities ranged from 1 to 1000. These results reflect the universities acquired outputs over the year that including academic reputation score, faculty student score, citation faculty score and international student score. These results indicate that universities in this cluster perform strongly in the relevant metrics.

If we decided to represent the cluster with the old rankings, we will find that each cluster includes different universities with a wide range of non-sequential and non-continuous rankings. Appendix A shows the universities' rankings, names and their respective cluster. The clusters mentioned above are also visible in the boxplots (see Figure 2) for variables academic reputation score, faculty student score, citation per faculty score, and international student score. Where clusters 1, 2, 3 and 4 are represented in blue, yellow, green and orange respectively.
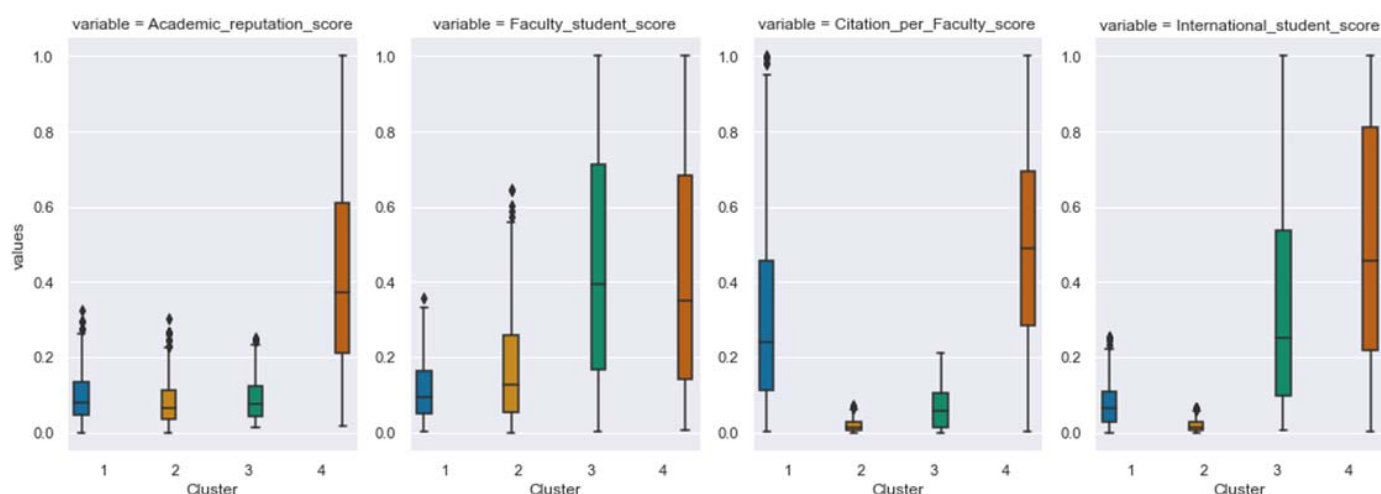

Figure 2. Boxplots of variables per cluster (academic reputation score, faculty student score, citation per faculty score, international student score).

4. Conclusions

Universities face national and international competition in the market every day; university rankings also increase competition among universities (Hazelkorn 2009). Ac-

cordingly, the governments try to support universities to improve their academic quality to be able to survive in the market (Dill and Soo 2005). Higher education institutions' performance is compared through university rankings as it helps student consumers to choose a suitable university. Moreover, it helps universities and policymakers in identifying the areas that need improvement (Dill and Soo 2005).

Since university ranking is an important performance measure that all universities consider in their goal setting and strategies, this study examines university rankings from a different perspective. We need to look at the universities according to the defined clusters not according to the order of the university in the overall ranking of universities.

This study shows that universities are divided into four clusters. Cluster one showed universities that excel in research through their citations. The second cluster represents universities that don't have a significant collaboration in all four tested variables. The third cluster shows universities that focus on internationalization where they most excel in both faculty students score and international student scores. Finally, the fourth cluster represents universities that have output shown in all four variables.

The results of this study imply that universities need to align their support goals with their intended output goals as Gross in 1969 proposed in the previous literature. The study also agrees with Bugaj and Rybkowski (2018) that support goals help universities establish the functioning of the whole university, which will influence the activities of the employees.

Higher education institutions have set public criteria for scholars (Gu and Blackmore 2019; Sullivan 1996). Accordingly, this study advises universities that have in their goals to have more citations and grow the research and join the first cluster, to set public criteria for the scholars. Other implications can be providing scholars with research workshops, time to develop the research and more collaboration with researchers from other respective institutions (Van't Land et al. 2021).

Soliman et al. 2019, advised that universities need to develop international goals and strategies as internationalization is part of the performance measures of universities. Internationalization is now considered a separate set of performance measures in QS World University Ranking (Soliman et al. 2019; Jöns and Hoyler 2013). Hence, this study agrees with the study of Soliman et al. (2019) and advise universities that need to position themselves among universities in the third cluster to develop their international goals by creating international programs, accepting international student and staff and opening new branches in different countries (Van't Land et al. 2021). Moreover, this study agrees with Bugaj and Rybkowski (2018) that internationalization helps to compete among other universities. The university that needs to increase its ranking in the fourth cluster must work on all four variables simultaneously, by setting its goals on all four variables and their supporting goals.

The author recommends league tables institutions use the cluster analysis developed in this study when developing the ranking, as it will help the classification of the universities efficiently. The author would recommend future work, clustering the universities on an annual basis to see the change in each cluster. This can also help in assessing the university outputs on an annual basis.

Appendix A

Table A1. List of universities with the respective cluster.

Rank_2022	Inst_Name	Cluster
1	Massachusetts Institute of Technology (MIT)	4
2	University of Oxford	4
3=	Stanford University	4
3=	University of Cambridge	4
5	Harvard University	4
6	California Institute of Technology (Caltech)	4
7	Imperial College London	4
8=	ETH Zurich-Swiss Federal Institute of Technology	4
8=	UCL	4
10	University of Chicago	4
11	National University of Singapore (NUS)	4
12	Nanyang Technological University, Singapore (NTU)	4
13	University of Pennsylvania	4
14=	EPFL	4
14=	Yale University	4
16	The University of Edinburgh	4
17	Tsinghua University	4
18	Peking University	4
19	Columbia University	4
20	Princeton University	4
21	Cornell University	4
22	The University of Hong Kong	4
23=	The University of Tokyo	4
23=	University of Michigan-Ann Arbor	4
25	Johns Hopkins University	4
26	University of Toronto	4
27=	McGill University	4
27=	The Australian National University	4
27=	The University of Manchester	4
30	Northwestern University	4
31	Fudan University	4
32	University of California, Berkeley (UCB)	4
33	Kyoto University	4
34	The Hong Kong University of Science and Technology	4
35	King's College London	4
36	Seoul National University	4
37	The University of Melbourne	4
38	The University of Sydney	4
39	The Chinese University of Hong Kong (CUHK)	4
40	University of California, Los Angeles (UCLA)	4
41	KAIST-Korea Advanced Institute of Science & Technology	4
42	New York University (NYU)	4
43	The University of New South Wales (UNSW Sydney)	4
44	Université PSL	4
45	Zhejiang University	4
46	University of British Columbia	4
47	The University of Queensland	4
48	University of California, San Diego (UCSD)	4
49=	Institut Polytechnique de Paris	4
49	The London School of Economics and Political Science (LSE)	4
50=	Shanghai Jiao Tong University	4
50=	Technical University of Munich	4
52	Duke University	4
53=	Carnegie Mellon University	4

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
53=	City University of Hong Kong	4
55	University of Amsterdam	4
56	Tokyo Institute of Technology (Tokyo Tech)	4
57	Delft University of Technology	4
58	Monash University	4
60	Brown University	4
61	The University of Warwick	4
62	University of Bristol	4
63	Ruprecht-Karls-Universität Heidelberg	4
64	Ludwig-Maximilians-Universität München	4
65	Universiti Malaya (UM)	4
66	The Hong Kong Polytechnic University	4
67	University of Texas at Austin	4
68	National Taiwan University (NTU)	4
69	Universidad de Buenos Aires (UBA)	4
70=	KU Leuven	4
70=	University of Zurich	4
72	Sorbonne University	4
73	University of Glasgow	4
74	Korea University	4
75=	Osaka University	4
75=	University of Wisconsin-Madison	4
77	University of Southampton	4
78	Lomonosov Moscow State University	4
79=	University of Copenhagen	4
79=	Yonsei University	4
81	Pohang University of Science And Technology (POSTECH)	4
82=	Durham University	4
82=	Tohoku University	4
82=	University of Illinois at Urbana-Champaign	4
85=	The University of Auckland	4
85=	University of Washington	4
86=	Université Paris-Saclay	4
87	Lund University	4
88	Georgia Institute of Technology	4
89	KTH Royal Institute of Technology	4
90	University of Birmingham	4
91	University of St Andrews	4
92	University of Leeds	4
93	The University of Western Australia	4
94	Rice University	4
95	The University of Sheffield	4
96	Pennsylvania State University	4
97	Sungkyunkwan University(SKKU)	4
98	University of Science and Technology of China	4
99	Technical University of Denmark	4
100	University of North Carolina, Chapel Hill	4
101	Trinity College Dublin, The University of Dublin	4
102	University of Oslo	4
103	University of Nottingham	4
104	University of Helsinki	4
105=	Universidad Nacional Autónoma de México(UNAM)	4
105=	University of Geneva	4
107	Washington University in St. Louis	4
108	The University of Adelaide	4
108=	University of California, Davis	4
109	King Abdulaziz University (KAU)	4
110	Utrecht University	4

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
111	Université de Montréal	4
112=	Aalto University	4
112=	Boston University	4
112=	Leiden University	4
112=	University of Southern California	4
116	Purdue University	4
117	Queen Mary University of London	4
118	Nagoya University	4
119	University of Bern	4
120	The Ohio State University	4
121=	Chalmers University of Technology	4
121=	Universidade de São Paulo	4
123	Wageningen University & Research	4
124	Uppsala University	4
125	Eindhoven University of Technology	4
126	University of Alberta	4
127	Freie Universitaet Berlin	4
128=	Humboldt-Universität zu Berlin	4
128=	University of Groningen	4
130	École Normale Supérieure de Lyon	4
131	Nanjing University	4
132	Lancaster University	4
133	University of Technology Sydney	4
134	Newcastle University	4
135	Pontificia Universidad Católica de Chile (UC)	4
136	KIT, Karlsruhe Institute of Technology	4
137	Kyushu University	4
138=	University of Basel	4
140	McMaster University	4
141	Ghent University	4
142	Politecnico di Milano	4
143	Universiti Putra Malaysia (UPM)	4
144	Universiti Kebangsaan Malaysia (UKM)	4
145	Hokkaido University	4
146	University of California, Santa Barbara (UCSB)	4
147	Universiti Sains Malaysia (USM)	4
148	Stockholm University	4
149=	The University of Exeter	4
149=	University of Waterloo	4
151=	Cardiff University	4
151=	University of Vienna	4
151=	University of York	4
154	University of Rochester	4
155	Aarhus University	4
156	Hanyang University	4
157	Michigan State University	4
158	University of Maryland, College Park	4
159	Technische Universität Berlin (TU Berlin)	4
160	Emory University	4
161=	Case Western Reserve University	4
161=	Tecnológico de Monterrey	4
163=	King Fahd University of Petroleum & Minerals	4
163=	University of Pittsburgh	4
165	RWTH Aachen University	4
166=	Alma Mater Studiorum-University of Bologna	4
166=	University of Bath	4
168=	Texas A&M University	4
168=	Universitat de Barcelona	4

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
170	Western University	4
171	Sapienza University of Rome	4
172	Albert-Ludwigs-Universitaet Freiburg	4
173=	University College Dublin	4
173=	University of Florida	4
175	Al-Farabi Kazakh National University	4
176	University of Lausanne	4
177=	Eberhard Karls Universität Tübingen	4
177=	Indian Institute of Technology Bombay (IITB)	4
179	Erasmus University Rotterdam	4
180=	National Tsing Hua University	4
180=	Technische Universität Wien	4
180=	University of Gothenburg	4
183=	Khalifa University of Science and Technology	4
183=	Universidad de Chile	4
185	Indian Institute of Technology Delhi (IITD)	4
186=	Indian Institute of Science	4
186=	University of Minnesota Twin Cities	4
188	Université catholique de Louvain (UCLouvain)	4
189=	University of Liverpool	4
189=	University of Twente	4
191=	Dartmouth College	4
191=	Universiti Teknologi Malaysia	4
193	University of Wollongong	4
194=	Curtin University	4
194=	Technische Universität Dresden	4
194=	University of Otago	4
197	The University of Newcastle, Australia (UON)	4
198	The Hebrew University of Jerusalem	4
199	University of Bergen	4
200	Macquarie University	4
201	Keio University	4
202	University of Reading	4
203	Waseda University	4
204	University of Göttingen	4
205	University of Aberdeen	4
206	RMIT University	4
207=	Universidad Autónoma de Madrid	4
207=	Universite libre de Bruxelles	4
209=	Universitat Autònoma de Barcelona	4
209=	Vrije Universiteit Amsterdam	4
211	Tongji University	4
212	Ulsan National Institute of Science and Technology (UNIST)	4
213	Queensland University of Technology (QUT)	4
214	Universität Hamburg	4
215	Chulalongkorn University	4
216=	Arizona State University	4
216=	Queen's University Belfast	4
218	Vanderbilt University	4
219	Universidade Estadual de Campinas (Unicamp)	4
220	Radboud University	4
221	Vrije Universiteit Brussel (VUB)	4
222	University of Notre Dame	4
223	Complutense University of Madrid	4
224	Qatar University	4
225	Wuhan University	4
226=	Rheinische Friedrich-Wilhelms-Universität Bonn	4
226=	University of Cape Town	4

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
226=	University of Sussex	4
226=	University of Virginia	4
230	University of Ottawa	4
231	Loughborough University	4
232	University of California, Irvine	4
233=	Maastricht University	4
233=	University of Antwerp	4
235	University of Calgary	4
236=	Harbin Institute of Technology	4
236=	Universidad de los Andes	4
236=	University of Leicester	4
236=	Victoria University of Wellington	4
240=	Queen's University at Kingston	4
240=	USI-Università della Svizzera italiana	4
242=	American University of Beirut (AUB)	4
242=	Saint Petersburg State University	4
242=	Università di Padova	4
245	Ecole des Ponts ParisTech	4
246=	Novosibirsk State University	4
246=	University of Massachusetts Amherst	4
248=	Georgetown University	4
248=	Universitat Pompeu Fabra (Barcelona)	4
250	Universiti Brunei Darussalam (UBD)	3
251	University of Colorado Boulder	4
252=	National Cheng Kung University (NCKU)	4
252=	Yeshiva University	4
254	Gadjah Mada University	4
255=	Indian Institute of Technology Madras (IITM)	4
255=	Mahidol University	4
255=	Tel Aviv University	1
258=	National University of Ireland Galway	4
258=	Universidad Nacional de Colombia	4
258	University of Canterbury	Te Whare Wānanga o Waitaha	4
260	Sun Yat-sen University	4
261=	Sciences Po	3
261=	Université de Paris	4
264=	Kyung Hee University	4
264=	Rutgers University–New Brunswick	4
266=	Charles University	4
266=	University of Navarra	4
268=	National Yang Ming Chiao Tung University	4
268=	The University of Arizona	4
269=	Technical University of Darmstadt	4
270=	Beijing Normal University	4
270=	Heriot-Watt University	4
272=	Dalhousie University	4
272=	Tomsk State University	3
272=	University of Surrey	4
275=	Southern University of Science and Technology	4
275=	Tufts University	4
277=	Graz University of Technology	3
277=	Indian Institute of Technology Kanpur (IITK)	1
277=	King Saud University	4
280	Indian Institute of Technology Kharagpur (IIT-KGP)	1
281=	Bauman Moscow State Technical University	3
281=	Universität Innsbruck	3
283	Deakin University	4
284	Massey University	4

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
285=	University of Illinois at Chicago (UIC)	4
285=	University of Tsukuba	4
287	Hong Kong Baptist University	4
288=	United Arab Emirates University	3
290=	Griffith University	4
290=	Moscow Institute of Physics and Technology (MIPT/Moscow Phystech)	3
290=	Universitas Indonesia	4
290=	Université Paris 1 Panthéon-Sorbonne	4
290=	Xi'an Jiaotong University	1
295=	Belarusian State University	3
295=	University of Porto	4
295=	University of Turku	4
298=	Simon Fraser University	4
298=	University College Cork	4
300=	North Carolina State University	1
300=	University of Tartu	3
302	University of Strathclyde	4
303=	Bandung Institute of Technology (ITB)	4
303=	University of Tasmania	4
305=	Gwangju Institute of Science and Technology (GIST)	1
305=	HSE University	4
307	University of East Anglia (UEA)	4
308	University of Warsaw	4
309=	Jagiellonian University	4
309=	University of Southern Denmark (SDU)	4
311=	Indiana University Bloomington	4
311=	University of Cologne	4
311=	University of Miami	4
314=	National Taiwan University of Science and Technology (Taiwan Tech)	4
314=	Université Grenoble Alpes	4
316	University of Milan	4
317=	IE University	3
317=	RUDN University	3
319=	National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)	3
319=	Universitat Politècnica de Catalunya · BarcelonaTech (UPC)	4
321	Swinburne University of Technology	4
322=	University of Dundee	4
322=	Friedrich-Alexander-Universität Erlangen-Nürnberg	4
322=	Pontificia Universidad Católica Argentina	3
322=	University of Macau	4
326=	Aalborg University	4
326=	University of South Australia	4
328	L.N. Gumilyov Eurasian National University (ENU)	3
329	Linköping University	4
330=	City, University of London	4
330=	Technion-Israel Institute of Technology	1
332=	Birkbeck, University of London	4
332=	Taylor's University	3
334=	Huazhong University of Science and Technology	1
334=	National Taiwan Normal University	4
334=	Politecnico di Torino	4
334=	Royal Holloway University of London	4
334=	Tianjin University	1
334=	University of Victoria (UVic)	4
340=	Goethe-University Frankfurt am Main	4
340=	University of Hawaii at Mānoa	4
342	Northeastern University	4
343	Hiroshima University	3

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
344=	Universität Jena	3
344=	Universiti Teknologi Brunei	3
346	Virginia Polytechnic Institute and State University	4
347=	Kazan (Volga region) Federal University	3
347=	UCSI University	3
347=	Universität Stuttgart	4
347=	University of California, Santa Cruz	1
351=	Brunel University London	4
351=	Universidad Carlos III de Madrid (UC3M)	4
351=	Ural Federal University-UrFU	3
354	Johannes Kepler University Linz	4
355	George Washington University	4
356=	Tilburg University	4
356=	University of Lisbon	4
358=	Nankai University	1
358=	National University of Sciences And Technology (NUST) Islamabad	3
358=	University of Jyväskylä	3
358=	University of Utah	4
362=	Ewha Womans University	3
362=	La Trobe University	4
362=	MGIMO University	3
365=	ITMO University	3
365=	Umea University	3
365=	University Ulm	4
368	Sultan Qaboos University	3
369=	Norwegian University of Science And Technology	4
369=	Universidade Federal do Rio de Janeiro	4
371	Universitat Politècnica de València	3
372	Lincoln University	4
373=	Beijing Institute of Technology	1
373=	University of Chemistry and Technology, Prague	3
373=	University of Connecticut	4
373=	University of Waikato	4
377	University of Oulu	1
378=	Julius-Maximilians-Universität Würzburg	1
378=	Quaid-i-Azam University	1
378=	Stony Brook University, State University of New York	4
381=	Sharif University of Technology	1
381=	Tokyo Medical and Dental University (TMDU)	3
383=	American University of Sharjah	3
383=	Beihang University (former BUAA)	1
383=	University of Kent	4
386	Kobe University	4
387	University of Kansas	3
388=	University at Buffalo SUNY	4
388=	University of Pisa	4
390	Università Vita-Salute San Raffaele	4
391=	SOAS University of London	3
391=	Universidad de Palermo (UP)	3
393=	Peter the Great St. Petersburg Polytechnic University	3
393=	Ruhr-Universität Bochum	4
395=	Indian Institute of Technology Guwahati (IITG)	1
395=	National Research Tomsk Polytechnic University	3
395=	Pontificia Universidad Católica del Perú	4
399	University of the Philippines	4
400=	Indian Institute of Technology Roorkee (IITR)	1
400=	Universidad Austral	3
400=	Vilnius University	3

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
403=	Czech Technical University in Prague	3
403=	Shandong University	1
403=	University of California, Riverside	1
407=	Flinders University	4
407=	South China University of Technology	1
407=	Taipei Medical University (TMU)	3
407=	Xiamen University	1
411	Westfälische Wilhelms-Universität Münster	4
412=	National Sun Yat-sen University	4
412=	Pontificia Universidad Javeriana	4
414=	Chung-Ang University (CAU)	3
414=	Lappeenranta-Lahti University of Technology LUT	1
414=	Tampere University	1
414=	Université Laval	4
414=	Universiti Teknologi PETRONAS (UTP)	1
414=	University of Colorado, Denver	3
414=	University of Science and Technology Beijing	1
421=	National Technical University of Athens	1
421=	Université de Strasbourg	4
423	Universität Mannheim	4
424=	James Cook University	4
424=	University of Naples-Federico II	4
424=	University of Witwatersrand	1
427=	Johannes Gutenberg Universität Mainz	4
427=	Washington State University	1
429=	Oxford Brookes University	4
429=	Wake Forest University	3
431=	Colorado State University	3
431=	Rensselaer Polytechnic Institute	4
431=	Universidade Nova de Lisboa	4
434=	Universidade Federal de São Paulo	3
434=	University of Johannesburg	3
436=	Shanghai University	4
436=	Tulane University	3
436=	University of Canberra	4
439	Essex, University of	4
440=	Swansea University	4
440=	University of Cyprus (UCY)	4
440=	University of Trento	1
440=	University of Tromsø The Arctic University of Norway	3
444	Illinois Institute of Technology	4
445=	HUFS-Hankuk (Korea) University of Foreign Studies	3
445=	The American University in Cairo	2
447=	Umm Al-Qura University	3
447=	UniversitätLeipzig	3
447=	Universität des Saarlandes	3
450	University of Milano-Bicocca	1
451=	Auckland University of Technology (AUT)	3
451=	Bond University	3
451=	Sichuan University	1
451=	University of Florence	4
455=	Brandeis University	4
455=	University of Coimbra	4
455=	University of Iowa	4
458	University of Saskatchewan	4
459=	Universidad Politécnica de Madrid (UPM)	4
459=	University of St.Gallen (HSG)	4

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
461=	Colorado School of Mines	1
461=	Far Eastern Federal University	3
461=	Goldsmiths, University of London	4
461=	Martin-Luther-Universität Halle-Wittenberg	3
465=	Airlangga University	2
465=	Amirkabir University of Technology	1
465=	Southeast University	1
465=	Universidad de Belgrano	3
469=	National Taipei University of Technology	4
469=	Universidad de Montevideo (UM)	3
471=	Ben-Gurion University of The Negev	1
471=	Hasselt University	3
471=	Universidad ORT Uruguay	3
471=	University of Stirling	4
475	Florida State University	1
476	University of Missouri, Columbia	4
477=	Bar-Ilan University	1
477=	Chiba University	3
477=	University of Texas Dallas	4
480=	Chang Gung University	4
480=	Université de Liège	4
482=	Auezov South Kazakhstan University (SKU)	3
482=	Stellenbosch University	1
482=	The Catholic University of Korea	3
485=	Aston University	4
485=	University of Turin	4
487=	The National University of Science and Technology MISIS	3
487=	Universidad de Santiago de Chile (USACH)	4
487=	Yokohama City University	3
490=	Dublin City University	3
490=	Justus-Liebig-University Giessen	1
492=	UNESP	4
492=	University of Granada	4
494=	Western Sydney University	4
494=	Boston College	1
494=	Christian-Albrechts-University zu Kiel	4
494=	Dongguk University	3
494=	Iowa State University	1
494=	Sogang University	3
494=	University of Rome "Tor Vergata"	4
494=	York University	4
501–510	Aix-Marseille University	4
501–510	Jilin University	4
501–510	Satbayev University	3
501–510	Universidad de La Habana	2
501–510	Universität Konstanz	1
501–510	University of Bordeaux	4
501–510	University of Delhi	4
501–510	University of Klagenfurt	3
501–510	University of Limerick	1
501–510	Warsaw University of Technology	4
511–520	Bogor Agricultural University	2
511–520	Koç University	3
511–520	Missouri University of Science and Technology	1
511–520	Singapore Management University	4
511–520	Universidad de Alcalá	3
511–520	Universiti Utara Malaysia (UUM)	3

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
511–520	University of Balamand	3
511–520	V. N. Karazin Kharkiv National University	3
511–520	Wayne State University	3
521–530	Central South University	1
521–530	China University of Geosciences	4
521–530	Concordia University	4
521–530	Imam Abdulrahman Bin Faisal University (IAU) (formerly UNIVERSITY OF DAMMAM)	3
521–530	National Central University	1
521–530	Universidad Central "Marta Abreu" de Las Villas	3
521–530	Université de Montpellier	4
521–530	University of Bayreuth	4
521–530	University of Eastern Finland	4
521–530	University of Tehran	1
531–540	Ajou University	3
531–540	East China Normal University	4
531–540	Hitotsubashi University	3
531–540	Institut National des Sciences Appliquées de Lyon (INSA)	3
531–540	Lehigh University	4
531–540	Nagasaki University	3
531–540	National Research Saratov State University	3
531–540	Oregon State University	1
531–540	Saint Joseph University of Beirut (USJ)	3
531–540	Southern Federal University	3
531–540	Universidad de Zaragoza	3
531–540	University of Delaware	1
541–550	Aberystwyth University	4
541–550	Iran University of Science and Technology	1
541–550	Kyungpook National University	3
541–550	Niigata University	3
541–550	Northwestern Polytechnical University	4
541–550	Sabanci University	3
541–550	The University of Georgia	1
541–550	The University of Tennessee, Knoxville	1
541–550	University of Ulsan	4
551–560	Abai Kazakh National Pedagogical University	3
551–560	Aristotle University of Thessaloniki	1
551–560	Kazakh National Agrarian University KazNAU	3
551–560	Masaryk University	4
551–560	Middle East Technical University	1
551–560	Universidad de Sevilla	4
551–560	Universidad Panamericana (UP)	3
551–560	Università Cattolica del Sacro Cuore	3
551–560	Université Paul Sabatier Toulouse III	3
551–560	University of Szeged	3
561–570	Altai State University	3
561–570	Hallym University	3
561–570	Inha University	3
561–570	Jawaharlal Nehru University	4
561–570	Technische Universität Braunschweig	3
561–570	The New School	3
561–570	Università degli Studi di Pavia	1
561–570	Université de Fribourg	4
571–580	Cairo University	4
571–580	Dalian University of Technology	1
571–580	East China University of Science and Technology	1
571–580	Holy Spirit University of Kaslik	3
571–580	Hunan University	1

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
571–580	Ivane Javakhishvili Tbilisi State University	3
571–580	Jeonbuk National University	3
571–580	Osaka City University	3
571–580	Universität Bremen	1
571–580	Universitat de Valencia	1
571–580	University of Minho	3
571–580	University of Nebraska-Lincoln	1
581–590	Lebanese American University	3
581–590	Lingnan University, Hong Kong	3
581–590	Murdoch University	4
581–590	Okayama University	3
581–590	Samara National Research University (Samara University)	3
581–590	Universidad Nacional de La Plata (UNLP)	4
581–590	University of Guelph	1
581–590	University of South Florida	1
591–600	Applied Science University-Bahrain	3
591–600	Bilkent University	1
591–600	Indian Institute of Technology Hyderabad	1
591–600	Kumamoto University	3
591–600	National Chengchi University	3
591–600	Savitribai Phule Pune University	3
591–600	Sofia University "St. Kliment Ohridski"	3
591–600	Universidad Externado de Colombia	2
591–600	Universität Regensburg	3
591–600	Université du Québec	4
591–600	University of Debrecen	3
591–600	University of Electronic Science and Technology of China	1
591–600	University of Ljubljana	3
601–650	Abo Akademi University	1
601–650	American University in Dubai	3
601–650	Ateneo de Manila University	2
601–650	Bangor University	4
601–650	Canadian University Dubai	3
601–650	Carleton University	4
601–650	Central Queensland University (CQUniversity Australia)	3
601–650	Chiang Mai University	2
601–650	China Agricultural University	1
601–650	Clark University	4
601–650	Coventry University	3
601–650	Gifu University	3
601–650	Kanazawa University	3
601–650	Kingston University, London	3
601–650	Konkuk University	3
601–650	Leibniz University Hannover	3
601–650	Management and Science University	3
601–650	Palacký University Olomouc	3
601–650	Pavol Jozef Šafárik University in Košice	3
601–650	Pusan National University	1
601–650	Renmin (People's) University of China	1
601–650	S.D. Asfendiyarov Kazakh National Medical University	3
601–650	Sejong University	1
601–650	Shenzhen University	3
601–650	Smith College	3
601–650	Soochow University	1
601–650	Taras Shevchenko National University of Kyiv	2
601–650	Thammasat University	2
601–650	Tokyo University of Agriculture and Technology	1
601–650	Universidad Anáhuac México	2

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
601–650	Universidad de Concepción	2
601–650	Universidad Pontificia Comillas	2
601–650	Universitat Ramon Llull	3
601–650	University of Aveiro	1
601–650	University of Cincinnati	1
601–650	University of Genoa	1
601–650	University of Hohenheim	4
601–650	University of Jordan	4
601–650	University of Manitoba	3
601–650	University of Plymouth	4
601–650	University of Pretoria	1
601–650	University of Sharjah	3
601–650	University of Siena	1
601–650	University of South Carolina	1
601–650	University Paris 2 Panthéon-Assas	3
601–650	Victoria University	4
651–700	American University	3
651–700	Chongqing University	1
651–700	College of William and Mary	3
651–700	Comenius University in Bratislava	3
651–700	Drexel University	4
651–700	Edith Cowan University	4
651–700	Eötvös Loránd University	4
651–700	Free University of Bozen-Bolzano	4
651–700	Howard University	3
651–700	Immanuel Kant Baltic Federal University	3
651–700	International Islamic University Malaysia (IIUM)	3
651–700	Jadavpur University	1
651–700	Kagoshima University	3
651–700	Karl-Franzens-Universitaet Graz	3
651–700	King Khalid University	2
651–700	Lahore University of Management Sciences (LUMS)	2
651–700	Lobachevsky University	3
651–700	Macau University of Science and Technology	4
651–700	Michigan Technological University	1
651–700	National and Kapodistrian University of Athens	1
651–700	National Chung Hsing University	1
651–700	National Technical University"Kharkiv Polytechnic Institute"	3
651–700	Pontifícia Universidade Católica do Rio de Janeiro	4
651–700	Sechenov University	3
651–700	Sunway University	3
651–700	Syracuse University	4
651–700	Tokushima University	3
651–700	Ulster University	3
651–700	Universidad de Antioquia	2
651–700	Universidad ICESI	3
651–700	Universidad Peruana Cayetano Heredia (UPCH)	2
651–700	Universidad Pontificia Bolivariana	2
651–700	Universidade Federal de Minas Gerais	4
651–700	Universität Rostock	3
651–700	Université Claude Bernard Lyon 1	1
651–700	Universiti Teknologi MARA-UiTM	2
651–700	University of Crete	1
651–700	University of Hull	4
651–700	University of Hyderabad	1
651–700	University of Kentucky	1
651–700	University of Massachusetts Boston	1

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
651–700	University of Mons	4
651–700	University of New Brunswick	3
651–700	University of New Mexico	1
651–700	University of Oklahoma	1
651–700	University of Oregon	1
651–700	University of Pecs	3
651–700	University of Portsmouth	3
651–700	University of Salamanca	4
651–700	University of Trieste	1
651–700	University of Vermont	3
651–700	Zayed University	2
701–750	Abu Dhabi University	3
701–750	Ajman University	3
701–750	Al Ain University	3
701–750	Beijing University of Technology	3
701–750	Boğaziçi University	1
701–750	Brno University of Technology	3
701–750	Charles Darwin University	4
701–750	City University of New York	2
701–750	Gunma University	3
701–750	Indian Institute of Technology Bhubaneswar	1
701–750	Instituto Tecnológico de Buenos Aires (ITBA)	3
701–750	Istanbul Technical University	1
701–750	Jouf University	2
701–750	Lebanese University	3
701–750	Middlesex University	3
701–750	National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"	2
701–750	New Jersey Institute of Technology (NJIT)	4
701–750	Northumbria University at Newcastle	3
701–750	Notre Dame University-Louaize NDU	3
701–750	O.P. Jindal Global University	2
701–750	Osaka Prefecture University	3
701–750	Philipps-Universität Marburg	1
701–750	Plekhanov Russian University of Economics	3
701–750	Politecnico di Bari	1
701–750	Prince Mohammad Bin Fahd university	3
701–750	Saint Petersburg Electrotechnical University ETU-LETI	3
701–750	Stevens Institute of Technology	4
701–750	Sumy State University	3
701–750	Tokyo Metropolitan University	1
701–750	Ufa State Aviation Technical University	3
701–750	Universidad de La Sabana	2
701–750	Universidad de San Andrés-UdeSA	2
701–750	Universidad Iberoamericana IBERO	2
701–750	Universidade de Santiago de Compostela	1
701–750	Universität Potsdam	4
701–750	Universitat Rovira i Virgili	1
701–750	Université Côte d\'Azur	4
701–750	Université de Sousse	3
701–750	University of Bradford	4
701–750	University of Haifa	3
701–750	University of Houston	1
701–750	University of Huddersfield	3
701–750	University of Modena and Reggio Emilia	1
701–750	University of Southern Queensland	4
701–750	University of the Basque Country	3
701–750	University of Westminster	3
701–750	University of Windsor	4

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
701–750	Virginia Commonwealth University	3
751–800	American University of the Middle East	3
751–800	Belarusian National Technical University (BNTU)	3
751–800	Bournemouth University	4
751–800	Chonnam National University	3
751–800	Chungnam National University	3
751–800	Clarkson University	1
751–800	Dankook University	2
751–800	Georgia State University	1
751–800	Institut Teknologi Sepuluh Nopember (ITS Surabaya)	2
751–800	Instituto Politécnico Nacional (IPN)	2
751–800	Instituto Tecnológico Autónomo de México (ITAM)	2
751–800	Jamia Millia Islamia	3
751–800	Jinan University (China)	4
751–800	Karaganda State Technical University	3
751–800	Keele University	4
751–800	Lanzhou University	1
751–800	Manipal Academy of Higher Education, Manipal, Karnataka, India	2
751–800	Maynooth University	1
751–800	Memorial University of Newfoundland	4
751–800	Northwest University (China)	3
751–800	Pontificia Universidad Católica de Valparaíso	2
751–800	Princess Nourah bint Abdulrahman University	3
751–800	Riga Technical University	3
751–800	Ritsumeikan University	1
751–800	Shiraz University	1
751–800	Southern Cross University	4
751–800	Tallinn University of Technology (TalTech)	3
751–800	Temple University	1
751–800	Universidad Adolfo Ibáñez	2
751–800	Universidad de la República (Udelar)	2
751–800	Universidad del Rosario	2
751–800	Universidad San Francisco de Quito (USFQ)	2
751–800	Universidad Torcuato Di Tella	3
751–800	Universidade Federal do Rio Grande Do Sul	4
751–800	Università degli Studi di Perugia	1
751–800	Université de Sherbrooke	1
751–800	Universiti Tenaga Nasional (UNITEN)	3
751–800	University at Albany SUNY	1
751–800	University Duesseldorf	3
751–800	University of Brescia	1
751–800	University of Central Florida	1
751–800	University of Denver	3
751–800	University of Greenwich	3
751–800	University of Maryland, Baltimore County	1
751–800	University of Zagreb	2
751–800	Vilnius Gediminas Technical University	3
751–800	Worcester Polytechnic Institute	4
801–1000	Academician Y.A. Buketov Karaganda University	2
801–1000	Adam Mickiewicz University, Poznań	2
801–1000	AGH University of Science and Technology	3
801–1000	Ain Shams University	2
801–1000	Ankara Üniversitesi	2
801–1000	Anna University	1
801–1000	Auburn University	1
801–1000	Australian Catholic University	3
801–1000	Bangladesh University of Engineering and Technology	2

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
801–1000	Beijing Foreign Studies University	3
801–1000	Beijing Jiaotong University	1
801–1000	Beijing University of Chinese Medicine	3
801–1000	Beijing University of Posts and Telecommunications	1
801–1000	Beirut Arab University	3
801–1000	Bielefeld University	1
801–1000	Binghamton University SUNY	1
801–1000	Budapest University of Technology and Economics	1
801–1000	Ca' Foscari University of Venice	1
801–1000	Catania University	1
801–1000	Charles Sturt University	3
801–1000	Clemson University	1
801–1000	Corvinus University of Budapest	3
801–1000	Cracow University of Technology (Politechnika Krakowska)	2
801–1000	CY Cergy Paris University	3
801–1000	Czech University of Life Sciences in Prague	3
801–1000	De La Salle University	2
801–1000	De Montfort University	3
801–1000	Edinburgh Napier University	3
801–1000	Financial University under the Government of the Russian Federation	2
801–1000	Florida International University	1
801–1000	Fordham University	3
801–1000	Gdańsk University of Technology	3
801–1000	George Mason University	1
801–1000	German Jordanian University	3
801–1000	Gulf University for Science and Technology	3
801–1000	Hacettepe University	2
801–1000	Harbin Engineering University	1
801–1000	Indiana University–Purdue University Indianapolis	1
801–1000	International Christian University	1
801–1000	Islamic University of Madinah	3
801–1000	Istanbul University	1
801–1000	Jordan University of Science & Technology	3
801–1000	Kansas State University	1
801–1000	Kasetsart University	2
801–1000	Kaunas University of Technology	3
801–1000	Kazakh Ablai Khan University of International Relations and World Languages	2
801–1000	Kazakh-British Technical University	2
801–1000	Kazan National Research Technological University	3
801–1000	Khon Kaen University	2
801–1000	King Faisal University	2
801–1000	King Mongkut's University of Technology Thonburi	2
801–1000	Kyoto Institute of Technology	1
801–1000	Kyushu Institute of Technology	1
801–1000	Liverpool John Moores University	3
801–1000	Lodz University of Technology	3
801–1000	London Metropolitan University	3
801–1000	London South Bank University	3
801–1000	Louisiana State University	1
801–1000	Loyola University Chicago	1
801–1000	Lviv Polytechnic National University	2
801–1000	Manchester Metropolitan University (MMU)	3
801–1000	Mendel University in Brno	3
801–1000	Mendeleev University of Chemical Technology	2
801–1000	Nanjing University of Aeronautics and Astronautics	1
801–1000	National Chung Cheng University	1
801–1000	Nicolaus Copernicus University	2

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
801–1000	NJSC KIMEP University	3
801–1000	Nottingham Trent University	3
801–1000	Novosibirsk State Technical University	3
801–1000	Oklahoma State University	1
801–1000	Paris Lodron University of Salzburg	4
801–1000	Perm State National Research University	2
801–1000	Pondicherry University	1
801–1000	Pontifícia Universidade Católica de São Paulo	2
801–1000	Poznań University of Technology	2
801–1000	Prince of Songkla University	2
801–1000	Princess Sumaya University for Technology	3
801–1000	Qassim University	2
801–1000	Queen Margaret University, Edinburgh	3
801–1000	Rhodes University	4
801–1000	Riga Stradins University	3
801–1000	Robert Gordon University	3
801–1000	Russian Presidential Academy of National Economy and Public Administration	2
801–1000	Rutgers University–Newark	1
801–1000	Ryerson University	1
801–1000	Seattle University	3
801–1000	Shinshu University	3
801–1000	Siksha 'O' Anusandhan (Deemed to be University)	2
801–1000	Silesian University of Technology	2
801–1000	Slovak University of Technology in Bratislava	2
801–1000	Sophia University	3
801–1000	South Ural State University (National Research University)	3
801–1000	Southern Methodist University	3
801–1000	Széchenyi István University	2
801–1000	Szent Istvan University	3
801–1000	Technical University of Kosice	3
801–1000	Technical University of Liberec	3
801–1000	Technological University Dublin	3
801–1000	Tecnológico de Costa Rica -TEC	2
801–1000	Texas Tech University	1
801–1000	The University of Alabama	1
801–1000	Tokyo University of Science	1
801–1000	TU Dortmund University	1
801–1000	Universidad Autónoma del Estado de Hidalgo (UAEH)	2
801–1000	Universidad Autónoma del Estado de México (UAEMex)	2
801–1000	Universidad Autónoma Metropolitana (UAM)	2
801–1000	Universidad Católica Andres Bello	2
801–1000	Universidad Católica del Uruguay (UCU)	2
801–1000	Universidad de Guadalajara (UDG)	2
801–1000	Universidad de las Américas Puebla (UDLAP)	3
801–1000	Universidad de Los Andes-(ULA) Mérida	2
801–1000	Universidad de los Andes-Chile	2
801–1000	Universidad del Valle	2
801–1000	Universidad Diego Portales (UDP)	2
801–1000	Universidad EAFIT	2
801–1000	Universidad Nacional de Córdoba-UNC	2
801–1000	Universidad Simón Bolívar (USB)	2
801–1000	Universidad Técnica Federico Santa María (USM)	2
801–1000	Universidad Tecnológica de Panamá (UTP)	2
801–1000	Universidad Tecnológica Nacional (UTN)	2
801–1000	Universidade Católica Portuguesa-UCP	2
801–1000	Universidade da Coruña	3
801–1000	Universidade de Brasília	2

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
801–1000	Universidade Federal de Pernambuco (UFPE)	2
801–1000	Universidade Federal de Santa Catarina	2
801–1000	Universidade Federal de São Carlos (UFSCar)	1
801–1000	Universidade Federal do Paraná-UFPR	2
801–1000	Universita' degli Studi di Ferrara	1
801–1000	Università degli Studi di Udine	1
801–1000	Università degli studi Roma Tre	1
801–1000	Universita' Politecnica delle Marche	1
801–1000	Universitas Padjadjaran	2
801–1000	Universität Duisburg-Essen	3
801–1000	Université de Lille	1
801–1000	Université de Lorraine	3
801–1000	Université de Nantes	1
801–1000	Université de Rennes 1	1
801–1000	Université Toulouse 1 Capitole	3
801–1000	Universiti Kuala Lumpur (UniKL)	2
801–1000	Universiti Malaysia Pahang	1
801–1000	Universiti Malaysia Perlis	2
801–1000	Universiti Tunku Abdul Rahman (UTAR)	2
801–1000	University of Alicante	1
801–1000	University of Baghdad	2
801–1000	University of Bahrain	3
801–1000	University of Bari	1
801–1000	University of Brighton	3
801–1000	University of Calcutta	1
801–1000	University of Central Lancashire	3
801–1000	University of Dhaka	2
801–1000	University of East London	3
801–1000	University of Engineering & Technology (UET) Lahore	2
801–1000	UNIVERSITY OF GDANSK	2
801–1000	University of Hartford	3
801–1000	University of Hertfordshire	3
801–1000	University of Hradec Kralove	2
801–1000	University of Kwazulu-Natal	1
801–1000	University of Lincoln	1
801–1000	University of Lodz	3
801–1000	University of Malta	3
801–1000	University of Maribor	3
801–1000	University of Messina (UniME)	1
801–1000	University of Mississippi	3
801–1000	University of Missouri, Kansas City	1
801–1000	University of Murcia	2
801–1000	University of Naples Parthenope	1
801–1000	University of New England Australia	1
801–1000	University of New Hampshire	1
801–1000	University of Palermo	1
801–1000	University of Parma	1
801–1000	University of Patras	1
801–1000	University of Salerno	1
801–1000	University of Salford	3
801–1000	University of Santo Tomas	1
801–1000	University of Seoul	3
801–1000	University of Texas at San Antonio	1
801–1000	University of the Punjab	2
801–1000	University of the West of England	3
801–1000	University of Tulsa	3
801–1000	University of Tyumen	3

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
801–1000	University of Wisconsin Milwaukee	1
801–1000	University of Wroclaw	1
801–1000	University of Wyoming	1
801–1000	University of Žilina	2
801–1000	Verona University	1
801–1000	Viet Nam National University Ho Chi Minh City (VNU-HCM)	2
801–1000	Vietnam National University, Hanoi	2
801–1000	Vytautas Magnus University	3
801–1000	West Virginia University	1
801–1000	Wroclaw University of Science and Technology (WRUST)	2
801–1000	Wuhan University of Technology	1
801–1000	Xi'an Jiaotong Liverpool University	1
801–1000	Yamaguchi University	2
801–1000	Yerevan State University	2
801–1000	Yeungnam University	1
801–1000	Yokohama National University	1
1001–1200	Al Quds University The Arab University in Jerusalem	2
1001–1200	Al-Azhar University	1
1001–1200	Alexandria University	2
1001–1200	Aligarh Muslim University	3
1001–1200	Amity University	3
1001–1200	Amrita Vishwa Vidyapeetham	2
1001–1200	Anadolu University	2
1001–1200	An-Najah National University	1
1001–1200	Assiut University	2
1001–1200	Athens University of Economics and Business	1
1001–1200	Azerbaijan State University of Economics	2
1001–1200	Babes-Bolyai University	2
1001–1200	Baku State University	2
1001–1200	Banaras Hindu University	1
1001–1200	Baylor University	1
1001–1200	Belarusian State University of Informatics and Radioelectronics	2
1001–1200	Benemérita Universidad Autónoma de Puebla	2
1001–1200	Bina Nusantara University (BINUS)	2
1001–1200	Birla Institute of Technology and Science, Pilani	1
1001–1200	Birmingham City University	3
1001–1200	BRAC University	2
1001–1200	Brigham Young University	1
1001–1200	British University in Egypt	2
1001–1200	Brock University	1
1001–1200	Canterbury Christ Church University	3
1001–1200	Católica de Córdoba	2
1001–1200	Chang Jung Christian University	2
1001–1200	China University of Political Science and Law	2
1001–1200	Chung Yuan Christian University	1
1001–1200	Chungbuk National University	3
1001–1200	COMSATS University Islamabad	1
1001–1200	Diponegoro University	2
1001–1200	Doshisha University	2
1001–1200	EGE UNIVERSITY	2
1001–1200	Escuela Politécnica Nacional	2
1001–1200	Escuela Superior Politécnica del Litoral (ESPOL)	2
1001–1200	Feng Chia University	1
1001–1200	Florida Atlantic University-Boca Raton	1
1001–1200	Fu Jen Catholic University	1
1001–1200	Gazi Üniversitesi	2
1001–1200	Glasgow Caledonian University	3

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
1001–1200	Harper Adams University	1
1001–1200	Imam Mohammad Ibn Saud Islamic University-IMSIU	1
1001–1200	Indian Institute of Information Technology, Allahabad	1
1001–1200	Irkutsk State University	2
1001–1200	Istanbul Aydin University	3
1001–1200	Istanbul Bilgi Üniversitesi	1
1001–1200	Ivan Franko National University of Lviv	2
1001–1200	Izmir Institute of Technology (IZTECH)	1
1001–1200	Jamia Hamdard	1
1001–1200	Jeju National University	2
1001–1200	Kangwon National University	1
1001–1200	Kent State University	1
1001–1200	King Mongkut\'s Institute of Technology Ladkrabang	2
1001–1200	Kookmin University	3
1001–1200	Kuwait University	3
1001–1200	Leeds Beckett University	1
1001–1200	Makerere University	1
1001–1200	Marquette University	2
1001–1200	Meiji University	2
1001–1200	Miami University	3
1001–1200	Mississippi State University	1
1001–1200	Multimedia University (MMU)	1
1001–1200	Mustansiriyah University	2
1001–1200	Mutah University	3
1001–1200	Nagoya Institute of Technology (NIT)	1
1001–1200	National Dong Hwa University	1
1001–1200	National Taiwan Ocean University	1
1001–1200	National University of Kyiv-Mohyla Academy (NaUKMA)	2
1001–1200	North South University	2
1001–1200	Northern Arizona University	1
1001–1200	North-West University	1
1001–1200	Ohio University	1
1001–1200	OSMANIA UNIVERSITY	1
1001–1200	Panjab University	1
1001–1200	Paul Valéry University Montpellier	3
1001–1200	Pontificia Universidad Católica del Ecuador (PUCE)	2
1001–1200	Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS)	1
1001–1200	Portland State University	1
1001–1200	Pukyong National University	1
1001–1200	Rikkyo University	2
1001–1200	Rochester Institute of Technology (RIT)	3
1001–1200	Russian State University for the Humanities	2
1001–1200	Saint-Petersburg Mining University	3
1001–1200	Saitama University	1
1001–1200	Saken Seifullin Kazakh Agrotechnical University	2
1001–1200	San Diego State University	1
1001–1200	Seoul National University of Science and Technology	1
1001–1200	Shahid Beheshti University (SBU)	1
1001–1200	Shanghai International Studies University	3
1001–1200	Sheffield Hallam University	3
1001–1200	Siberian Federal University, SibFU	1
1001–1200	Slovak University of Agriculture in Nitra	2
1001–1200	Sookmyung Women's University	2
1001–1200	Suez Canal University	2
1001–1200	Taibah University	2
1001–1200	Tallinn University	3
1001–1200	Technical University of Lublin	1

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
1001–1200	Telkom University	2
1001–1200	Thapar Institute of Engineering & Technology	1
1001–1200	The Herzen State Pedagogical University of Russia	3
1001–1200	The National Research University "Belgorod State University"	3
1001–1200	The University of Lahore	2
1001–1200	The University of Northampton	3
1001–1200	The University of Texas at Arlington	3
1001–1200	Tokai University	2
1001–1200	Tomas Bata University in Zlin	3
1001–1200	Ton Duc Thang University	2
1001–1200	Universidad Andrés Bello	2
1001–1200	Universidad Austral de Chile	2
1001–1200	Universidad Autónoma de Nuevo León	2
1001–1200	Universidad de Castilla-La Mancha	1
1001–1200	Universidad de La Frontera (UFRO)	1
1001–1200	Universidad de Lima	2
1001–1200	Universidad de Monterrey (UDEM)	2
1001–1200	Universidad de Puerto Rico	2
1001–1200	Universidad de Talca	2
1001–1200	Universidad de Valparaíso (UV)	2
1001–1200	Universidad del Desarrollo (UDD)	2
1001–1200	Universidad del Norte	2
1001–1200	Universidad del Pacífico	2
1001–1200	Universidad Industrial de Santander-UIS	2
1001–1200	Universidad Metropolitana	2
1001–1200	Universidad Nacional Agraria la Molina	2
1001–1200	Universidad Nacional de Cuyo	1
1001–1200	Universidad Nacional de la Asunción	2
1001–1200	Universidad Nacional de San Martín (UNSAM)	2
1001–1200	Universidad Nacional, Costa Rica	2
1001–1200	Universidad Peruana de Ciencias Aplicadas	2
1001–1200	Universidad Rey Juan Carlos	1
1001–1200	Universidad Tecnológica de la Habana José Antonio Echeverría, Cujae	2
1001–1200	Universidade de Vigo	1
1001–1200	Universidade do Estado do Rio de Janeiro (UERJ)	2
1001–1200	Universidade Federal da Bahia	2
1001–1200	Universidade Federal de Viçosa (UFV)	1
1001–1200	Universidade Federal do Ceará (UFC)	2
1001–1200	Universidade Federal Fluminense	2
1001–1200	Universita' degli Studi "G. d'Annunzio" Chieti Pescara	1
1001–1200	Università degli Studi della Tuscia (University of Tuscia)	1
1001–1200	Universitas Brawijaya	2
1001–1200	Universitas Hasanuddin	2
1001–1200	Universität Siegen	3
1001–1200	Universitatea de Vest din Timisoara/West University of Timisoara	2
1001–1200	Université de Poitiers	3
1001–1200	Université de Toulouse II-Le Mirail	3
1001–1200	Université Jean Moulin Lyon 3	3
1001–1200	Université Lumière Lyon 2	1
1001–1200	Université Paris-Nanterre	2
1001–1200	Universiti Malaysia Sabah (UMS)	2
1001–1200	Universiti Malaysia Sarawak (UNIMAS)	1
1001–1200	Universiti Malaysia Terengganu (UMT)	2
1001–1200	University of Agriculture, Faisalabad	1
1001–1200	University of Arkansas Fayetteville	1
1001–1200	University of Belgrade	2
1001–1200	University of Bialystok	2
1001–1200	University of Bucharest	2

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
1001–1200	University of Calabria	1
1001–1200	University of Colombo	2
1001–1200	University of Derby	3
1001–1200	University of Ghana	2
1001–1200	University of International Business and Economics	3
1001–1200	University of Karachi	2
1001–1200	University of Kufa	2
1001–1200	University of Latvia	1
1001–1200	University of Miskolc	2
1001–1200	University of Montana Missoula	1
1001–1200	University of Mumbai	1
1001–1200	University of Niš	2
1001–1200	University of North Carolina at Charlotte	1
1001–1200	University of North Texas	1
1001–1200	University of Ostrava	3
1001–1200	University of Pardubice	3
1001–1200	University of Peradeniya	2
1001–1200	University of Rhode Island	1
1001–1200	University of Rijeka	2
1001–1200	University of San Diego	1
1001–1200	University of San Francisco	3
1001–1200	University of Silesia in Katowice	1
1001–1200	University of South Alabama (USA)	2
1001–1200	University of Texas El Paso	1
1001–1200	University of the Pacific	3
1001–1200	University of the Sunshine Coast	4
1001–1200	University of the Western Cape	1
1001–1200	University of Wolverhampton	3
1001–1200	Utah State University	1
1001–1200	Vellore Institute of Technology (VIT)	1
1001–1200	Voronezh State University	3
1001–1200	VSB-Technical University of Ostrava	3
1001–1200	Warsaw University of Life Sciences-SGGW (WULS-SGGW)	1
1001–1200	Western Michigan University	1
1001–1200	Youngsan University	2
1001–1200	Yuan Ze University	1
1201+	Don State Technical University	1
1201+	Akdeniz Üniversitesi	2
1201+	Al-Balqa Applied University	2
1201+	Alexandru Ioan Cuza University	1
1201+	Aoyama Gakuin University	2
1201+	Bahauddin Zakariya University	1
1201+	Birzeit university	2
1201+	Cukurova University	2
1201+	Damascus University	2
1201+	Dokuz Eylül Üniversitesi	2
1201+	German University in Cairo	2
1201+	Hanoi University of Science and Technology	2
1201+	Helwan University	2
1201+	Hongik University	1
1201+	Indiana State University	2
1201+	Kindai University (Kinki University)	2
1201+	Lucian Blaga University of Sibiu	2
1201+	Mansoura University	2
1201+	Marmara University	2
1201+	MIREA-Russian Technological University	2
1201+	Moscow City University	2

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
1201+	Moscow Pedagogical State University	3
1201+	National Research University Moscow Power Engineering Institute (MPEI)	3
1201+	National Taipei University	2
1201+	Pontifícia Universidade Católica do Paraná	2
1201+	Russian State Agrarian University-Moscow Timiryazev Agricultural Academy	2
1201+	Sakarya University	1
1201+	Shanghai University of Finance and Economics	2
1201+	Shibaura Institute of Technology	1
1201+	Soochow University (Taiwan)	2
1201+	Southwest University	2
1201+	SRM INSTITUTE OF SCIENCE AND TECHNOLOGY	2
1201+	Stefan cel Mare University of Suceava	3
1201+	Sudan University of Science and Technology	2
1201+	Suranaree University of Technology	2
1201+	Tamkang University	1
1201+	Tanta University	2
1201+	Technical University of Cluj-Napoca	2
1201+	The "Gheorghe Asachi" Technical University of Iasi	1
1201+	The Hashemite University	1
1201+	The University of Notre Dame, Australia	2
1201+	Toraighyrov University	2
1201+	Transilvania University of Brasov	2
1201+	Tunghai University	1
1201+	Universidad Autónoma de Baja California	2
1201+	Universidad Autónoma de Chile	2
1201+	Universidad Autónoma de Querétaro (UAQ)	2
1201+	Universidad Autónoma de San Luis de Potosí	2
1201+	Universidad Autonoma de Yucatan	2
1201+	Universidad Autónoma del Estado de Morelos (UAEM)	2
1201+	Universidad Bernardo O'Higgins	2
1201+	Universidad Católica Boliviana "San Pablo"	2
1201+	Universidad Católica de Colombia	2
1201+	Universidad Católica de Santiago de Guayaquil	2
1201+	Universidad Católica del Norte	2
1201+	Universidad de Guanajuato	2
1201+	Universidad de La Salle	2
1201+	Universidad de La Serena	1
1201+	Universidad de las Fuerzas Armadas ESPE (Ex-Escuela Politécnica del Ejército)	2
1201+	Universidad de Medellín	2
1201+	Universidad de Panamá-UP	2
1201+	Universidad de Sonora	2
1201+	Universidad del Bío-Bío	2
1201+	Universidad del Salvador	1
1201+	Universidad Mayor de San Andrés (UMSA)	2
1201+	Universidad Nacional de Quilmes	2
1201+	Universidad Nacional del Litoral	2
1201+	Universidad San Ignacio de Loyola	2
1201+	Universidad Tecnológica de Bolívar	2
1201+	Universidad Tecnológica de Pereira	2
1201+	Universidade Estadual de Londrina	2
1201+	Universidade Federal da Paraíba	2
1201+	Universidade Federal de Goiás	2
1201+	Universidade Federal de Santa Maria	2
1201+	Università degli studi di Bergamo	1
1201+	Universitas Andalas	2
1201+	Universitas Muhammadiyah Surakarta	2
1201+	Universitas Sebelas Maret	2

Table A1. *Cont.*

Rank_2022	Inst_Name	Cluster
1201+	Universitas Sumatera Utara	2
1201+	Université de Caen Normandie	1
1201+	Université de Tunis El Manar	2
1201+	Université Mohammed V de Rabat	2
1201+	University of Babylon	2
1201+	University of Khartoum	2
1201+	University of Kragujevac	2
1201+	University of Sarajevo	2
1201+	University of Split	2
1201+	University POLITEHNICA of Bucharest	2
1201+	University Politehnica of Timisoara, UPT	2
1201+	Yarmouk University	1
1201+	Yildiz Technical University	1
1201+	Zagazig University	2

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