India's quest for world-ranked universities

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With the rise in importance of global university rankings, countries and universities are vying to improve their rankings and compete to be in the top 200. In this article, we look at the age, size, and funding of the top universities globally, and do a similar analysis for the top higher education institutions (HEIs) in India. The analysis shows that in the world top 200 universities, over 65% were founded before 1900 and only 7% after 1975, while in India about 60% HEIs were founded after 1975, and only 3% before 1900. In size, over 90% of the world's top 200 universities have a student strength of more than 10,000 and less than 3% have less than 5000. In terms of faculty, about 70% have more than 1000 faculty members and only 6% have less than 500. In India, on the other hand, only about 15% of the top HEIs have more than 10,000 students while more than half have student strength of less than 5000; and only 2% have more than 1000 faculty and over 80% have faculty size less than 500. Finally, R&D spending of the top global research universities can be as much as ten times that of other research universities, while in India the resources are more evenly distributed with top universities having about 50% higher support. While nothing can be done about age, size and funding levels are within the realm of planning and policy making. The analysis suggests that to be in the global top 200 universities, some of the top HEI in India should be expanded to become globally comparable in size, and support for them should be substantially increased.

Keywords: Global university rankings, higher education institutions, research funding, university age and size.

THIS century has seen a rise in importance of global university rankings which has led to universities vying with one another to improve their rankings and compete to be in the top 200 globally. There are various rankings, though recently Times Higher Education (THE) and QS rankings are more widely quoted and recognized.

Global university rankings depend to a great degree on research performance and impact of the universities. For example, the THE Rankings give 30% weight to citations, 30% to research, and of the 30% weight given to teaching, about 8% is related to the Ph D programme. Some others consider awards, fellowships, papers in top journals, etc. As a result, all these top universities are well known for their strong emphasis on research.

In India, as in many other countries, it is a matter of pride to have some universities in the top 200 bracket. And every time the rankings are out, there are articles in newspapers as to why so few (in QS Rankings) or no (in THE Rankings) Indian universities are in the top 200. Then there are exhortations and views about the reasons and solutions. No serious study has been done to understand the key characteristics of the top global universities and the top Indian universities, and to compare and contrast them – an understanding which can help plan towards placing some of the Indian universities in the top bracket.

In this article, we look at the top 200 universities globally according to THE rankings[1], and the top higher education institutions (HEIs) in India according to NIRF (National Institutional Ranking Framework)[2], and see how they compare with respect to a few key features. For top HEIs in India, we consider the top 100 in universities and the top 100 in the engineering category of NIRF – these include most of the top institutions in India like IISc, JNU, BHU, Delhi University, Jadavpur, IITs, NITs, IIITs, etc., but exclude HEIs in the field of medicine, law, pharma, management, etc.

Age

The evolution of research universities took shape as the Humboldt model of higher education, which proposed an integration of teaching and research, spread in 1800s. It started from Germany and was adapted and vigorously adopted in USA. Many new universities were founded which had research as an important goal, and many older universities reoriented themselves to become more research-focused. And many of these universities dominate

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the world rankings today. Of the top 200 ranked universities in THE Rankings, Table 1 gives the number of institutions founded in different time periods.

We can see that more than 65% of the universities were founded in the 19th century, when the Humboldt model started spreading rapidly. Only 19% were founded after 1950, by which time the current model of research universities with a focus on the Ph D programme was firmly established, and around the time India got independence. It is clear that older universities dominate the research universities scene, though it is possible to establish good quality research universities within a span of 40 years (as 15 have done so).

Late entrants indeed have a significant challenge in joining this elite club. First, just to get a decent research programme going takes at least a decade or more, as it may take a few years to start a Ph D programme, and at least another 5 years for the first Ph D student to graduate. Second, impact of research is fundamentally time-dependent and often it takes decades for the impact to be recognized. Third, the impact that the graduates of a university make, through which its perception is strengthened, increases with time. In fact, this impact starts becoming visible only when these graduates reach some seniority and their contributions become more visible – something that can take decades. Clearly, the longer the university has been involved with research and graduating students, the stronger will be the impact. In other words, age helps in impact of research as well as impact of graduates – both of which are important in global rankings. Consequently, for making it to the top league, age of universities helps, and young institutions have a significant hurdle in making it to this league.

Contrast the situation of global top 200 universities with the situation in India. We consider the age of top 100 universities and top 100 engineering institutions according to NIRF ranking. Table 2 gives the age profile of these institutions. (Date of establishment of universities has been obtained from the UGC website[3].)

Table 1. Date of establishment of top-ranked universities

Date	No. of universities
Before 1900	132
Between 1900 and 1950	30
Between 1950 and 1975	23
After 1975	15

Table 2. Date of establishment of top universities/institutions in India

Date	Top 100 universities	Top 100 engineering institutions
Before 1900	2	4
Between 1900 and 1950	10	7
Between 1950 and 1975	23	35
After 1975	65	54

As we can see, in contrast to world top 200 universities, where only 7% were founded after 1975, in India among the top HEIs, about 60% were founded after 1975. Only six HEIs were founded before 1900, while in the world top 200 universities, over 65% were founded before 1900.

Let us look at the age distribution of all the universities/institutes in India that grant degrees. Currently, there are about 900 universities and about 90 institutes which are listed as Institutions of National Importance. Among these, only eight HEIs were founded before 1900 (of the four universities founded before 1900 – universities of Bombay, Madras, Allahabad, and Calcutta – only Calcutta and Madras are listed in NIRF top 100). Only 29 were founded in the first half of the 20th century (and most of these show up in the NIRF list). In the quarter century after independence (between 1950 and 1975), a total of 105 were founded, including the original five IITs. Over 80% were founded after 1975, and about 70% (670) were founded in this century. It is clear that modern India is a late starter in the world of higher education (ancient India was a leader with great universities like Nalanda and Takshashila), and much of the expansion in higher education, including adding institutions with focus and potential for research, is very recent.

Size

Another factor that plays a major role is size of the university. Among the top 200 universities (from THE Rankings), Tables 3 and 4 give the size in terms of number of students and faculty respectively.

As we can see, over 90% of universities have student strength of more than 10,000 (over 60% have actually more than 20,000 students), and just about 2% have a student population of less than 5000. In terms of faculty size, only 6% of universities have faculty size of <500 and about 70% have more than a 1000 faculty members.

Large size will naturally imply that the university has faculty and departments in more disciplines, leading to wider research contribution and scope as well as interdisciplinary research. A large faculty will also lead to more

Table 3. Student size in top-ranked universities globally

No. of students	No. of universities
<5000	5
Between 5000 and 10,000	13
> 10,000	182
> 20,000	125

Table 4. Faculty size in top-ranked universities globally

No. of faculty	No of universities
<500	12
Between 500 and 1000	49
>1000	139

research, which also increases the chances of high-impact research. And a larger population of students graduating each year implies that their contribution, impact and influence in society are larger. These are important in building the stature and perception of a university.

Contrast this with the situation in India. Tables 5 and 6 give the size in terms of students and faculty of the top HEIs in India respectively.

In terms of student size, among the engineering institutions only seven have more than 10,000 students, and only two of them (IIT Kharagpur and Anna University) are public institutions – these are also the only ones ranked in the top 10 engineering institutions. The two engineering institutions with student population more than 20,000 are both private universities. (It is important to recognize that in India, most private HEIs, particularly in engineering, are teaching-led and were started to serve the important function of meeting the education needs.) The universities tend to be larger, still half of them have student strength of less than 5000, and among the eight that have student strength of more than 20,000, only two are public universities (BHU and Delhi University) – these are also the only ones in the top 10 in India according to NIRF.

In terms of faculty size, there are only three HEIs (less than 2%) with faculty size of more than 1000 (one HEI is included in both categories), and the overwhelming majority (over 80%) of our top-ranked HEIs have a faculty size of less than 500.

In the top 200 universities in the world, more than 90% have student strength of more than 10,000, while in India only about 15% have student strength of more than 10,000. About 70% of the top world universities have faculty strength of more than 1000 and only 6% have faculty size less than 500. In India, only about 2% have faculty size of more than 1000 and about 80% have faculty size less than 500.

Funding

Research universities are extremely expensive. There are several reasons for this – the faculty is expensive as these are the top brains who have to be compensated well. This cost is further increased as such faculty in these institutions teach fewer courses than their counterparts in teaching-focused institutions, thereby requiring more numbers. These universities have a large doctorate programme, which is hugely expensive (as PhD students are mostly paid) and this is often missing in teaching-focused institutions. And for conducting research, these universities need to have cutting-edge facilities and equipment, suitable library resources, support for travel to attend conferences, etc. for faculty and PhD students. All this adds substantial cost.

Data on total R&D or total expenditure for top 200 ranked universities are not available on THE site. For understanding the funding aspects, we looked at data provided by the Carnegie Classification of Universities in the US[4], which classifies universities as research, Master's, Baccalaureate, etc. This classification has identified about 300 US universities as research universities (less than 10% of the total universities in the US), which are further classified into three sub-categories: R1 (highest research activity), R2 (high research activity) and R3 (moderate research activity). About 100 universities are classified in each of the sub-categories.

Carnegie's data give the average per faculty R&D expenditure of the research universities in the different sub-categories. The average R&D expenditure per faculty in the research universities in the R1 sub-category (most of these are in the global top 200) is USD 294,000. The average in the research universities in the R3 sub-category is USD 32,000. The difference is almost a factor of 10; and this is between two sub-categories of the research universities.

In India, we considered the top 100 NIRF universities. As R&D expenditure is not given separately, we looked at the average total expenditure per faculty for the top 30 and bottom 30 (about one-third) universities. The average expenditure per faculty for the top 30 universities (from the top 100) is about Rs 50 lakhs, and the average expenditure per faculty for the last 30 universities (in the top 100) is Rs 36 lakhs. That is, the average per faculty expenditure in the top 30 universities (of the top 100) is not even 50% more than the average expenditure per faculty in those ranked between 70 and 100.

Let us look at the expenditure from another angle. We considered the budget of the universities ranked 151 to 200 in THE. The rationale for selecting these was that this is realistically the ranking range which can be targeted by Indian universities in the near future; so it is better to look at investments in these rather than the top-ranked universities, where the figures will be much higher. We determined the total expenditure of some of these

Table 5. Student size in top HEIs in India

No. of students	Top 100 universities	Top 100 engineering institutions
<5000	50	68
Between 5000 and 10,000	27	25
>10,000	23	7
>20,000	8	2

Table 6. Faculty size in top HEIs in India

No. of faculty	Top 100 universities	Top 100 engineering institutions
<500	79	94
Between 500 and 1000	18	5
>1000	3	1

universities from their websites, Wiki pages, etc.[5]. From the data we compiled, the average per faculty expenditure (after removing outliers and those for which we could not get the budget data), is about USD 0.5 million. For some of the countries, the number of universities in this group, and the average expenditure per faculty in million USD are Australia (1 university) – 0.74, Canada (3) – 0.45, China (1) – 0.57, Hong Kong (1) – 0.34, Italy (3) – 0.35, The Netherlands (3) – 0.4, UK (9) – 0.25 and USA (11) – 0.61.

As mentioned above, in India, the per faculty expenditure in the top 30 universities is Rs 50 lakhs, or about 0.07 million USD. Even after considering the fact that manpower and some other costs are lower in India (though research equipment, international travel, digital library subscriptions, etc. all cost the same as in other countries), this level of investment is clearly significantly lower than the expenditure in universities ranked 150–200 in any of the countries mentioned above.

In India, the funding approach tends to be of an egalitarian nature. Most public institutions get grant support to cover the basic costs of manpower and running the institute, e.g. for salaries, power, water, consumables, etc. (Besides this, grants are given occasionally for capital expenses – mostly for new buildings or facilities – to be used exclusively for that purpose.) There is usually little support in the annual budget for research, and even in the top HEIs 80% of the budget may be for committed expenses. And the research grant funding is not only rather limited, it is spread over the 100s of HEIs, as well as a host of research laboratories across the country.

The top research universities, which can possibly reach global rankings, need a substantially higher funding, than those which focus more on teaching and have modest research capability, if they are to reach the global top levels. Such universities need disproportionate financial support, at least at the levels prevailing in some of the globally top universities.

Summary

A vast majority of the top 200 globally ranked universities are over a 100 years old, and are large with a student population of more than 10,000 and faculty size of more than 1000. They also have high per faculty R&D expenditure. In other words, the universities that make it to the top ranks are mostly older institutions, which are large in size both in terms of faculty and students, and which spend heavily on R&D.

In India, on the other hand, the vast majority of the top-ranked HEIs are young, majority being founded in this century. The size of our HEIs is also generally small – most have a faculty size of less than 500, and student population of less than 5000. And the investment for research in the top HEIs is much lower.

While nothing can be done about age, the other two parameters are within the realm of planning and policy-making. For expanding the higher education system, the approach India has taken is to establish new institutions, sometimes at a hectic pace. To have presence in the global top universities, while growing the higher education system, besides establishing new institutions, some of the top ones may be supported to expand and become globally comparable in size. Some can be grown organically, and some by merging existing institutions (an approach that Australia followed).

Similarly, the general approach in the country is to spread the funding as much as possible, so as to benefit the largest number of institutions. For top HEIs to reach world rankings, they will have to be supported disproportionately. This is the approach that China has taken by its C9 programme, in which nine universities are supported disproportionately – they have 3% of the researchers but get over 10% of the research funds. The investments in research for the top HEIs in India will have to increase substantially – at least a few times the level at which they are currently being supported – if they are to make it to global ranks.

It must be emphasized that just size and funding (and age), will not automatically ensure a position in the top 200 – it will clearly require these universities (with size and funding) to have strong systems to encourage and support high-quality research, recruit the best talent and promote meritocracy, build a culture of innovation and vibrancy, have strong leadership and governance, etc.

It should also be kept in mind that world ranking is indeed a zero sum game – for an Indian HEI to be in the top 200, a university currently in the top 200 will have to be removed from the club. And as countries are eager to have their presence in the elite group of top world universities, many countries and universities are also trying to improve or make it to the top rankings. In other words, there will be tough competition – with the existing ranked universities as well as other aspirants across the world. Therefore, it will not suffice to just incrementally improve the support to our HEIs, but improve them at a faster pace compared to other competitors to make it to the top list.

1. https://www.timeshighereducation.com/world-university-rankings, or data about the top-ranked universities.
2. https://www.nirfindia.org/2018/Ranking2018.html. Data on the top 100 universities and top 100 engineering institutions.
3. https://www.ugc.ac.in. Consolidated list of all universities (as on 25 September 2018).
4. carnegieclassifications.iu.edu. Data from the 2015 edition.
5. University websites and Wikipedia pages. Data on year of establishment of world universities and their budget.