India's Quest for World Ranked Universities

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Summary. 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 note, 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 created before 1900 and only 7% were created after 1975, while in India about 60% HEIs were created after 1975, and only 3% HEIs were created before 1900. In size, over 90% of the world top 200 have a student strength of more than 10,000 and less than 3% have student strength of less than 5000. In terms of faculty, about 70% have more than 1000 faculty members, and only 6% have a faculty size of 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 of less than 500. Finally, the R&D spending of the top global research universities can be as much as 10 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, some of the top HEI should be expanded to become globally comparable in size, and support for these HEIs should be increased substantially.

Background

This century has seen rise in importance of global university rankings which has led to universities vying to improve their rankings and compete to be in the top 200 globally. There are various rankings, though recently THE and QS rankings are more widely quoted and recognized.

Global university rankings depend heavily on the research performance and impact of the universities. For example, the Times Higher Education (THE) ranking gives 30% weight to citations, 30% weight to research, and of the 30% weight it gives to teaching, about 8% is relating to the PhD program. Some others consider awards, fellowships, papers in top journals, etc. As a result, all these top universities are well known research universities which have a 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 rankings come out, there are articles in newspapers as to why so few (in QS rankings) or none (in THE rankings) Indian universities are in top 200. And 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 compare and contrast them – an understanding which can help plan a path for taking some of the Indian Universities in the top bracket.

In this note, we look at the top 200 universities globally as per THE ranking [THE site], and the top higher education Institutions (HEIs) in India as per NIRF (National Institutional Ranking Framework) [NIRF site], and see how they compare in a few key features. For top HEIs in India, we consider the top 100 in the University and top 100 in the Engineering categories of NIRF – these include most of the top institutions in India including 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 the USA. Many new universities were created which had research as an important goal, and many older universities reoriented themselves to become more research focused. And many of these universities dominate the world rankings today. Of the top 200 ranked universities in THE rankings, the number of institutions created in different time periods is given in Table 1:

Table 1: Date of creation of top ranked universities

Date of creation of the Univ	No of Univs
Created before 1900	132
Between 1900 and 1950	30
Between 1950 and 1975	23
After 1975	15

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

Late entrants indeed have a significant challenge in reaching this elite club. First, just to get a decent research program going takes at least a decade or more, as it may take a few years to start a PhD program, and after starting the program it takes at least 5 years for the first PhD to graduate. Second, impact of research is fundamentally time dependent and often it takes decades for impact to be recognized. Third, the impact the graduates of a university make through which the perception of the university 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 producing graduates and research, 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 universities league age helps, and young institutions have a significant hurdle in making it to this league.

Contrast the situation of global top 200 with the situation in India. We consider the age of top 100 universities and top 100 engineering Institutions as per NIRF ranking. The age profile of these institutes is given in Table 2. (Date of creation of Universities is obtained from UGC website [UGC site].)

Table 2: Date of creation of top HEIs in India

Date of creation of the Univ	Top 100 Univs	Top 100 Engg Inst
Created 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, where only 7% were created after 1975, in India of the top HEIs, about 60% were created after 1975! And only 6 HEIs were created before 1900, while in the world top 200, over 65% were created before 1900.

The age distribution of all the HEIs in India is even more skewed towards youth. Currently, there are about 900 universities and about 90 HEI which are listed as Institutions of National Importance. Of these, only 8 HEIs were created before 1900 (of the four universities created before 1900 – Universities of Mumbai, Madras, Allahabad, and Calcutta – only Calcutta and Madras are listed in NIRF top 100). And only 29 were created 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 to 1975), a total of 105 HEIs were created, including the original 5 IITs. Over 80% of the current HEIs were created after 1975, and about 70% (670) of the HEIs were created 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 heavily in being a top-class research university is the size of the university. Of the top 200 universities (from THE), the size in terms of number of students and faculty is given in Tables 3 and 4:

Table 3: Students in top ranked universities globally

Size in terms of no of students	No of Univs
Size < 5K	5
Size between 5K and 10K	13
Size > 10K	182
Size > 20K	125

Table 4: Faculty size in top ranked universities globally

Size in terms of no of faculty	No of Univs
Size < 500	12
Size between 500 and 1000	49
Size > 1000	139

As we can see, over 90% 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 5,000. In terms of faculty size, only 6% 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 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 is larger. And both of these are important in building the stature and perception of a university.

Contrast this with the situation in India. The size in terms of students and faculty of the top HEIs in India is given in the tables 5 and 6:

Table 5: Students in top HEIs in India

Size in terms of no of students	Top 100 Univs	Top 100 Engg Inst.
Size < 5K	50	68
Size between 5K and 10K	27	25
Size > 10K	23	7
Size > 20K	8	2

Table 6: Faculty size in top HEIs in India

Size in terms of no of faculty	Top 100 Univs	Top 100 Engg Inst
Size < 500	79	94
Size between 500 and 1000	18	5
Size > 1000	3	1

In terms of student size, in the engineering institutions only 7 have more than 10,000 students, and only two of them (IIT Kharagpur and Anna University) are public institutions – these are also the only engineering institutions ranked in the top 10 engineering institutions. The two engineering institutions with student population more than 20000 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 a student strength of less than 5000, and of the 8 that have a 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 as per NIRF.

In terms of faculty size, there are only 3 HEIs (less than 2%) with a faculty size of more than a 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 a student strength of more than 10000, while in India only about 15% have a student strength of more than 10000. And while about 70% of the top world universities have a faculty strength of more than 1000 and only 6% have a faculty size of less than 500, in India only about 2% have faculty size of more than 1000 and about 80% have a faculty size of less than 500.

Funding

Research universities are extremely expensive. There are a host of 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 faculty. These universities have a large doctorate program, which is hugely expensive (as PhD students are mostly paid) and 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 the faculty and PhD students. All this adds substantial cost.

Data on total or R&D or total expenditures for top 200 ranked universities is not available on THE site. For understanding the funding aspects, we looked at the data provided by the Carnegie Classification of Universities in the US [Carnegie classification site, 2015 edition], which classifies universities as Research,

Masters, 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). Appx. 100 universities are in each of the sub-categories.

Carnegie's data gives 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 (highest research activity, most of these are in the global top 200) is $ 294K. The average in the research universities in the R3 sub-category (medium research activity) is $32K. 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 the bottom 30 (about one-third) universities. The average expenditure per faculty for the top 30 universities (from the top 100) is about Rs 50 Lacs, and the average expenditure per faculty for the last 30 universities (in the top 100) is Rs 36 Lac. That is, the average per faculty expenditure in the top 30 (of the top 100) is not even 50% more than the average expenditure per faculty in the ones ranked between 70-100.

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 universities from their websites, Wiki pages, etc. 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, is: Australia (1 university) – 0.74 Million USD, Canada (3) – 0.45, China (1) – 0.57, HK (1) – 0.34, Italy (3) – 0.35, Netherlands (3) – 0.4, UK (9) – 0.25, US (11) – 0.61.

As mentioned above, in India, the per faculty expenditure in the top 30 universities is Rs 50 Lac, 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 to build 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 labs across the country.

The top research universities, which can possibly reach global rankings, need a substantially higher funding, than a university which focuses more on teaching and has modest research capability, if they are to reach the global top levels. Such universities need a 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 10000 and a faculty size of more than 1000. And they 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 created 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 create new Institutions, sometimes at a hectic pace. To have presence in the global top universities, while growing the higher education system, besides creating 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 Australia took.)

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 China has taken by its C9 program, 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 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 rankings is indeed a zero sum game – for an Indian HEI to be in top 200, a university currently in the top 200 will have to get out of 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 as compared to other competitors to make it to the top list.

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