DESIDOC Journal of Library & Information Technology, Vol. 41, No. 1, January 2021, pp. 20-36, DOI : 10.14429/djlit.41.1.16675

Five Years of India Rankings and its Impact on Performance Parameters of Engineering Educational Institutions in India. Pt.1. Teaching, Learning and Resources, Graduate Outcome, Outreach and Inclusivity and Perception

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ABSTRACT

This article analyses data on five years of India rankings to assess its impact on performance parameters of institutions of higher education on four (out of five) broad categories of parameters, namely i) Teaching, Learning and Resources; ii) Graduation Outcome; iii) Outreach and Inclusivity; and iv) Perception. The analysis on data on four years of India Rankings, i.e. 2017 to 2020 on various performance parameters of HEIs in engineering discipline provides an interesting insight and reveals that participating institutions are making strenuous effort to improve their performance on various parameters or sub-parameters identified under NIRF. The analyses reflect that performance of remaining eligible institutions has improved on most of the ranking parameters in comparison to the100 top-ranked institutions over a period of four years of ranking, i.e. from 2017 to 2020.

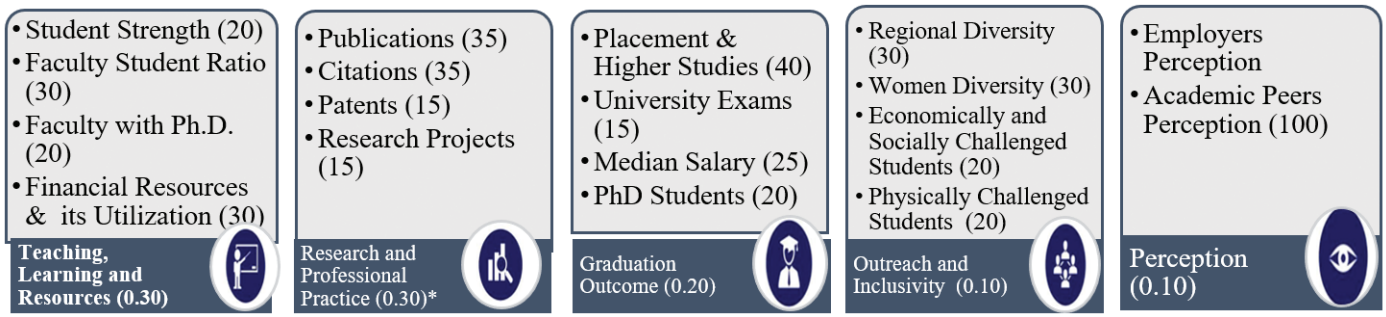
Keywords: Ranking parameters; Ranking indicators; India rankings; National institutional ranking framework; Higher education institutions – ranking; Graduate outcome; Perception; Reputation; Teaching and learning; Outreach; Inclusivity

1. INTRODUCTION

The academic world is accustomed to ranking of different types, forms and orders. Students are assigned ranks based on their performance in examination, teaching faculty are selected based on their performance in academics. Promotions are awarded to faculty based on their research and teaching performance. Moreover, journals are ranked according to their impact factors and even publishers are ranked based on their impressions by the scholarly community, on analyses of prize winners of scientific associations, discipline, a publisher's reputation, and its impact factor[1]. Using the same analogy, media houses and a number of non-commercial organisations started publishing ranking tables based on indicators that are believed to represent quality of HEIs. These indicators are allocated different, predetermined weightage, that are added-up to give a total score, which, in turn, determines rank of an HEI. Primary aim of ranking is to facilitate stakeholders including students & their parents, policy makers, funding agencies and universities to take informed decision about qualities of HEIs and their performance on various indicators. The HEIs themselves can use these indicators to improve their own standing on various indicators.

With introduction of Academic Ranking of World University by Shanghai Jiao Tong Institute in 2003 and QS-Times Higher Education (THE) Rankings in 2004, the phrase "world-class university" caught attention of academicians, policy makers and political leaders around the world. The term "world-class university" does not only represent excellence in teaching and research, but also signifies capacity of a university to compete in the global higher education marketplace. As a consequence, Governments of several countries have developed policies, regulatory framework, and have taken special initiatives to promote and support creation of world-class university and upgradation of the existing universities to the world class. An increasingly larger number of universities have included "world-class" as a target to achieve in their mission statements and have begun implementing various measures. The Indian higher education system is in dire need of infusion of quality and clarity in its approach towards building world-class university in the Indian context and environment. New benchmarks of quality need to be defined and put in place to help overall education system to move up on quality ladder and institutions of higher education are required to be directed and oriented to focus on international standards of excellence so as to pitch themselves for higher ranks in various global ranking systems. Realizing the fact that ranking of Indian HEIs at national level can play an important role in setting-up a culture of competition that would lead to improvement in performance and quality of academic institutions, National Institutional Ranking Framework[2] was released by the Minister for Education (Formerly MHRD), Government of India in

Received : 21 December 2020, Revised : 07 January 2021
Accepted : 13 January 2021, Online published : 11 February 2021



*Research and professional practice is being dealt with in the Part II of this article.

Figure 1. NIRF parameters for ranking of institutes.

September 2015, which is being used for rankings HEIs in India from 2016 onwards.

The unitary data collected from participating institutions as well as from third-party sources is made available in public domain, either through the NIRF web site or through web sites of participating institutions that are mandatorily required to host the data provided by them to NIRF for public scrutiny. The part I of the article analyses data on five years of India Rankings to assess its impact on performance parameters of institutions of higher education on four (out of five) broad categories of parameters, namely:

- Teaching, learning and resources;
- Graduation outcome;
- Outreach and inclusivity;
- Perception.

The analysis on data on various performance parameters provides an interesting insight and reveals that participating institutions are making strenuous effort to improve their performance on various parameters or sub-parameters identified under NIRF with an aim to improve their ranking as well as for claiming their eligibility for research funds, scholarships and other amenities that can be availed only by students and faculty of ranked institutions as well as by the ranked institutions themselves. While there are a number of articles that describe impact of ranking on various aspects of university performance and functioning as reported in literature review, however, none of the studies deal with progressive impact of ranking on different performance parameters of HEIs over a period of time.

2. ABOUT NATIONAL INSTITUTIONAL RANKING FRAMEWORK AND INDIA RANKINGS

India rankings is an annual exercise that ranks institutions of higher education in India in various categories and subject domains using National Institutional Ranking Framework (NIRF), released by the Ministry of Education, Government of India in September 2015. The framework was used for the maiden edition of India Rankings in the year 2016 as well as for all its subsequent annual editions from 2017 to 2020 for ranking of HIEs in various categories and subject domains. Institutions were ranked in four categories / subject domains, namely university, engineering, management and pharmacy in the first edition of India rankings released in April 2016. Over the years, in addition to the above mentioned four categories, new categories and subject domains were added including an "Overall" category and ranking for college, law, medical, architecture. The fifth and the latest edition of India Rankings was released virtually on 11th June 2020 in all the nine categories / subject domains, and in addition, ranking was also released for a new domain named "Dental" in the year 2020.

Unlike other rankings in the popular media, India Rankings deploys objective performance parameters to assess performance of the academic institutions in India in the higher education space. The ranking framework provides for ranking of institutions on five broad generic groups of parameters, i.e. teaching, learning and resources, research and professional practice, graduation outcomes, outreach and inclusivity and perception. Score is computed based on inputs on each sub-parameter under each of the five broad parameters as per methodology for a given category or subject domain available on the NIRF website[3]. Ranks are assigned based on total sum of marks assigned for each of these five broad groups of parameters. Figure 1 provides an outline of the various sub-parameters for each of the five generic groups.

3. SOURCE OF DATA

In the absence of a reliable and comprehensive database that could supply all relevant data required for computing the scores for ranking, the India Rankings invites institutions to register and submit the required data on parameters mentioned above through an online data capturing system (DCS) available on the NIRF website. Likewise, perceptions of peers and employers are captured through a web-based interface developed for this specific purpose. The data thus captured is stored in MS SQL database accessible to the authors of this article since all authors of this article are fully involved at all stages of India rankings. Most of the data used in this article is from India Rankings - Engineering domain since this domain is being ranked from 2016 onwards when India Ranking was released for the first time. Moreover, data on publications, citations, highly cited papers, patent granted and patent published, etc. are retrieved by the authors of this paper from third party sources. However as mentioned above, these aspects are dealt with in the Part II of this article.

4. IMPACT OF RANKING ON INSTITUTIONS OF HIGHER EDUCATION: LITERATURE REVIEW

Ranking systems are designed to measure quality

of teaching, learning and research for different groups of stakeholders, which, in turn, affect them in different ways, whether individually or as a group[4]. Thakur[4] further elaborated that there are sufficient evidence, whether anecdotal or empirical, to establish that ranking systems have transformed the higher education landscape. Altbach[5] observed that university rankings and league tables are having an ever greater impact on HEIs because of globalisation and massification of higher education. Ranking can be instrumental in improving performance and quality of academic institutions[6]. While the global rankings of HEIs have generated a strong drive amongst universities to improve their comparative position and stimulated global competition for attracting researchers and recruiting the best younger talent, the national ranking systems have prompted strong desires amongst HEIs to achieve higher rank both as a symbol of national achievement and prestige and as engines of economic growth in a global knowledge economy[7]. These responses, on the part of institutions of higher education, have cemented the role of the rankings themselves and further intensified competitive pressures amongst HEIs[7]. Carey[8], cautioned that rankings mean the loss of freedom and independence for institutions to control their brand and the terms of their success. Rankings put institutions in a mould and affect institutional diversity, hence affecting the way they operate within and across higher education borders. Julie Bishop[9], the Australian Education Minister, stated that the development of a diversified higher education sector begins with universities which differ from each other in terms of their mission. Similarities in universities' mission statements, suggest that ranking systems may have indirectly influenced diversity (or lack of) in the higher education sector.

Ranking systems are known to have substantial effect on behaviour of universities[10]. Despite all the criticisms about parameters and methodologies used in ranking institutions of higher education, rankings are nevertheless shaping the behaviour of institutions[11]. Universities, all over the world, are revisiting their mission and vision statements laying greater emphasis on improving their performance in various national and international rankings. Several institutions, directly or indirectly spurred by ranking systems, have already developed mission statements (or visions and goals) to "become one of the world's top research universities"[12], "be among the world's truly great universities"[13] and "one of the world's top-ranked universities in the 21st century"[14]. National governments in various countries are introducing competition in their HEIs for funding and other resources, which, in turn, is leading to trend toward market competition among HEIs in both national systems and in the international sphere.

Rolfe[15] found similar influence on the behaviour of universities in the UK in a study involving sample of old and new universities in UK. It was observed that universities were committing substantial expenditures on marketing staff, consultants, and professional agencies for placement of students, developing "brand image" using professional advice and advertisements[16].

Gormley and Weimer[17] in their research on organisational rankings similar to university rankings suggested that ranking can serve as a useful instrument for public accountability, supplying information to consumers and policymakers on measurable differences in service quality, while also providing an incentive to organisations for quality improvement.

5. IMPACT ON PERFORMANCE PARAMETERS OF INDIA RANKINGS 2016 – 2020

This part of the article presents an analyses of data on five years of India Rankings to assess impact of India Rankings on performance of universities on parameters used for ranking of institutions of higher education. The part I of article provides analysis on a selected number of sub-parameters under four

Table 1. Number of students in engineering discipline in the 100 top-ranked Institutions v/s remaining eligible institutions

India rankings year		2017	2018	2019	2020	Per cent increase from 2017 to 2020
No. of Institutions		946	860	901	1007	
Under-graduate	Top 100	372440	364768	373087	404759	8.68
	Remaining	1567192	1577018	1726819	1808099	15.37
Post-graduate*	Top 100	68331	73867	70524	74090	8.43
	Remaining	105787	77784	73182	71046	-32.84
Ph.D.(Full-time)	Top 100	29598	32868	35103	39380	33.05
	Remaining	6147	4981	8024	9426	53.34
Total (PG + Ph.D.)	Top 100	97929	106735	105627	113470	15.87
	Remaining	111934	82765	81206	80472	-28.11
Total (UG + PG + Ph.D.)	Top 100	470369	471503	478714	518229	10.17
	Remaining	1679126	1659783	1808025	1888571	12.47

* Including students in integrated programs

broad generic groups of parameters, i.e. teaching, learning and resources, graduation outcomes, outreach and inclusivity and perception.

5.1 Teaching Learning and Resources

Quality of teaching and research are two most important and fundamental parameters that are commonly used to assess the excellence of universities. A top-rated university, for a prospective student, probably means a university where teaching is of the highest order and the faculty are successful researchers and genuine authorities in their respective subject domains[18]. Altbach[19], however, states that there are, in fact, no widely accepted methods for measuring teaching quality, and assessing the impact of education on students is so far an unexplored area as well.

Four sub-parameters under the "Teaching Learning and Resources (TLR)", the first broad categories of parameters used for India rankings is given weightage of 0.30. It consists of four sub-parameters, namely, student strength (20 marks), faculty-student ratio (30 marks), faculty with Ph.D. and experience (20 marks), and financial resources and their utilisation (30 marks).

Table 2. Faculty student ratio in eligible engineering institutions

Faculty Student Ratio	2017 (2015-2016)	2018 (2016-2017)	2020 (2018-2019)	% Increase from 2017 to 2020
1 to 10	3	2	1	-66.67
11 to 20	335	274	346	3.28
21 to 30	357	395	515	44.26
31 to 40	106	102	111	4.72
41 to 50	56	31	34	-39.29
50 +	90	57	0	-100
Total	947	861	1007	

5.1.1 *Student Strength*

The higher education system has undergone an unprecedented expansion in most countries in terms of increase in gross enrolment ratio and financial resources committed on it by different countries. Although total number of students consistently shows a positive and statistically significant effect on the graduation rate[20], however, quantitative expansion of higher education has triggered worries about the quality achieved[21].

The data on student strength of eligible institutions in India rankings for four years in engineering domain is given in Table 1 which reveals that number of students enrolled at UG, PG and Ph.D. levels have increased year after year consistently in the 100 top-ranked HEIs with maximum increase of 33.05 per cent at Ph.D. level and overall increase of 10.17 per cent. However, undergraduate students represent 78.10 per cent of total student strength, remaining 19.90 per cent are postgraduate and Ph.D. students in the 100 top-ranked engineering institutions. It can also be observed that remaining engineering institutions have registered decrease of 28.11 per cent in student strength at Ph.D. & PG level, however, overall students strength in remaining institutions have also registered an increase of 12.47 per cent.

5.1.2 *Faculty-Student Ratio*

Faculty-student ratio (FSR) is an objective measure of excellence in teaching which is a core function of HEIs. FSR can be calculated objectively to assess teaching quality since smaller classes facilitate better class participation and improved communication between the lecturer and students[18]. Taylor and Braddock[18] mentioned that it can be assumed that

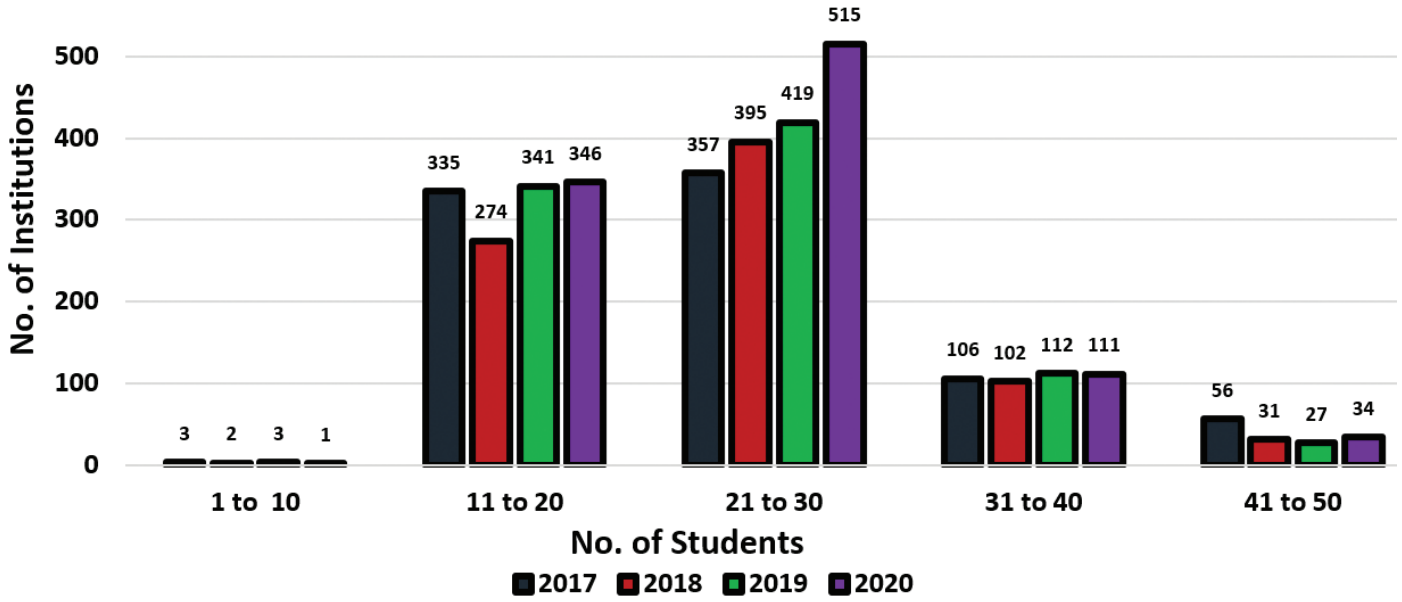


Figure 2. Faculty student ratio in eligible engineering institutions.

Table 3. Faculty qualifications of engineering institutions from 2017 to 2020

Academic year (India Rankings Year)		2015-16 (2017)	2016-17 (2018)	2017-18 (2019)	2018-19 (2020)	% Increase (2017 to 2020)
No. of Institutions		946	860	901	1007	6.45
No. of Faculty with PhD	Top 100	16050	17554	19337	20987	30.76
	Remaining	16259	17413	22353	27564	69.53
No. of Faculty with Masters'	Top 100	10176	8943	8372	8515	16.32
	Remaining	73301	69304	76609	77364	5.54
Average No. of Faculty with PhD	Top 100	161	176	193	210	30.43
	Remaining	19	23	28	30	57.89
	% Difference	747.37	665.22	589.29	600	
Average No. of Faculty with Masters'	Top 100	102	89	84	85	-16.67
	Remaining	87	91	96	85	-2.30
	% Difference	17.24	-2.2	-12.5	0	

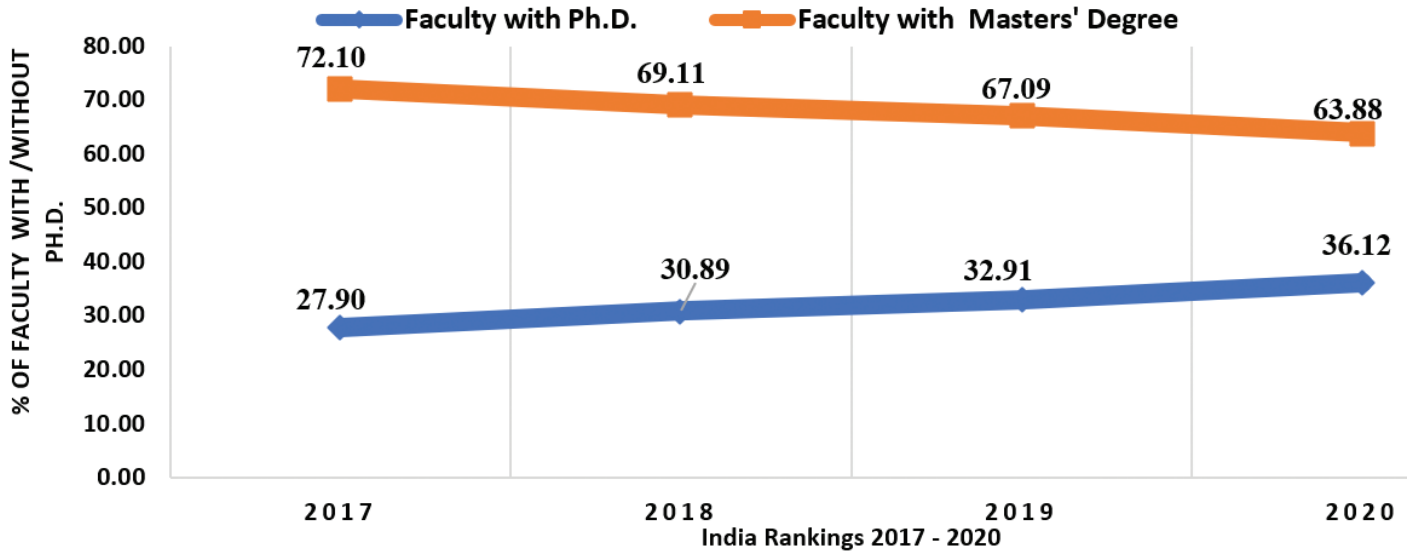


Figure 3. Faculty qualifications of engineering institutions from 2017 to 2020.

staff who are involved in research, and good at it, will be, on the whole, good at teaching too as they will be sufficiently knowledgeable about the subject taught although empirical studies could not establish that there is a positive correlation between teaching ability and research productivity[22]. Faculty-student ratio (FSR) is used as an input indicator by a total no. of 10 out of 12 national rankings and 2 out of 8 international rankings systems surveyed by Çakır *et al.*[23].

Faculty-student ratio (FSR) across eligible institutions in engineering category from 2017 to 2020 has improved over past four years, i.e. from 2017 to 2020. As shown in Table 2 and Fig. 2, while only 1 to 3 institutions qualified for FSR of 1 to 10 between 2017 and 2020, number of institutions who qualify for FSR in three ranges, i.e. 11 to 20, 21 to 30 and 31 to 40 have registered variable increase. At the same time, FSR of 41 to 50 has decreased by 39.29 per cent from 2017 to 2020. Increase in FSR between 11 to 40 reveals that a large number of institutions are trying for a better and acceptable FSR, possibly both for improving their ranking as well as for accreditation and approval by the All India Council for Technical Education (AICTE).

5.1.3 *Faculty Qualification and Experience*

Qualifications and experience of faculty is identified as one of the important performance parameters under teaching, learning and resources prescribed by NIRF and used in India

Table 4. Experience of faculty in engineering institutions from 2017 to 2020

Academic year (India rankings year)		2015-16 (2017)	2016-17 (2018)	2017-18 (2019)	2018-19 (2020)	% Increase from 2017 to 2020
No. of Institutions		946	860	901	1007	6.45
No. of Faculty up to 8 years Experience	Top 100	9118	8624	8272	8800	3.49
	Remaining	53581	47242	49927	46674	12.89
No. of Faculty with 8 -15 years Experience	Top 100	7703	8025	8532	8924	15.85
	Remaining	20751	22584	27956	32637	57.28
No. of Faculty with > 15 years Experience	Top 100	9405	9848	10905	11778	25.23
	Remaining	15228	16891	21079	25617	68.22
Average No. of Faculty up to 8 years Experience	Top 100	91	86	83	88	-3.30
	Remaining	63	62	62	51	-19.05
	% Difference	44.44	38.71	33.87	72.55	
Average No. of Faculty with 8 -15 years Experience	Top 100	77	80	85	89	15.58
	Remaining	25	30	35	36	44.00
	% Difference	208	166.67	142.86	147.22	
Average No. of Faculty with > 15 years Experience	Top 100	94	98	109	118	25.53
	Remaining	18	22	26	28	55.56
	% Difference	422.22	345.45	319.23	321.43	

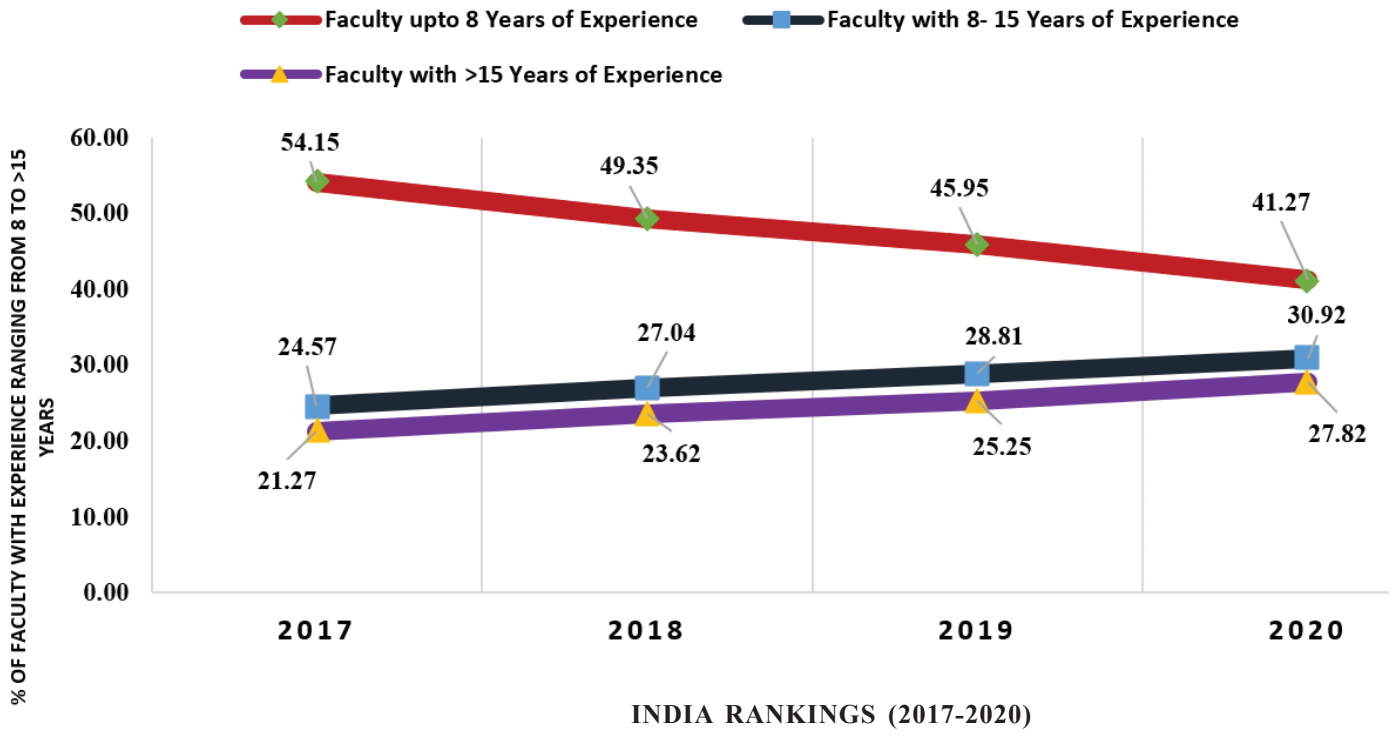


Figure 4. Experience of faculty in engineering institutions from 2017 to 2020.

Rankings. Faculty with Ph.D. is considered as an objective measure to assess teaching ability of a teacher using mentorship received during the doctoral training, which, in turn, can play a vital role in preparing the faculty for a teaching career in higher education. Faculty with Ph.D. is used as an input indicator by a total no. of 8 national ranking systems out of 12 surveyed by Çakır *et al.*[23].

Table 3 compares faculty qualifications of the 100 top-ranked institutions with faculty qualifications of remaining eligible engineering institutions over a period of four years of India Rankings, i.e., from 2015-16 to 2018-2019. It can be observed that average no. of faculty with Ph.D. degree of the 100 top-ranked institutions has increased from 161 in 2015-2016 to 210 in 2018-2019, marking increase of 30.43 per cent over a period of four year, whereas average no. of faculty with Ph.D. degree of remaining institutions has increased from 19 in 2015-2016 to 30 in 2018-2019, marking an increase of 57.89 per cent over a period of four years.

Table 5. Median FRU per students for the 100 Top-ranked engineering institutions v/s remaining eligible institutions

India ranking years	No. of Insts.	Median financial resources and their utilization (FRU) per student		% Difference
		Top 100	Remaining	
2017	946	135786	42801	217.25
2018	860	168661	55187	205.62
2019	901	211444	61191	245.55
2020	1007	233155	62993	270.13
% Increase from 2017 to 2020		71.71	47.18	

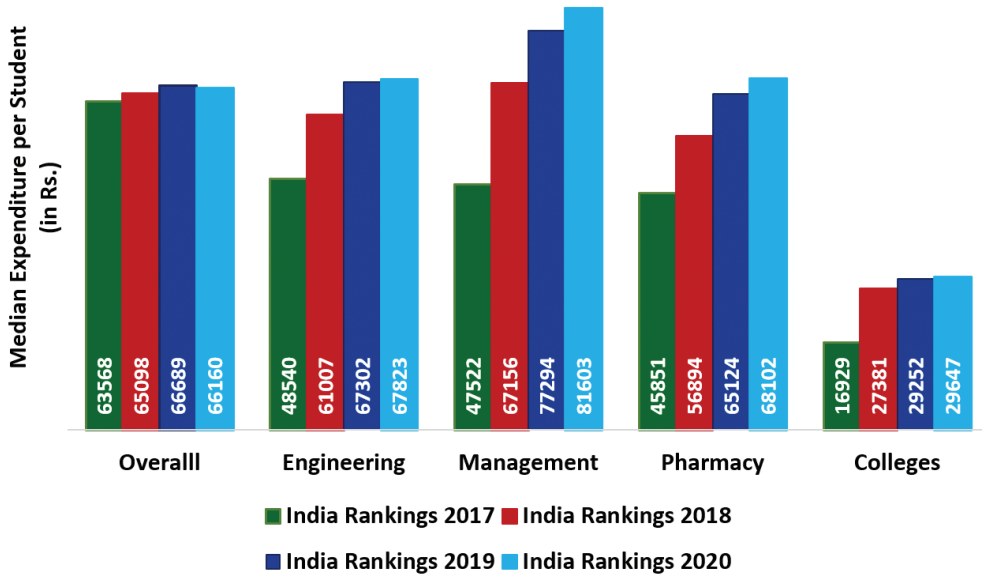


Figure 5. Median FRU for different categories and disciplines.

Figure 3 depicts that while faculty with Ph.D. have increased gradually from 27.90 per cent in 2015-16 to 36.12 per cent in 2018-19, whereas faculty with Master's degree registered gradual decline from 72.10 per cent in 2015-16 to 63.88 per cent in 2018-19.

Table 4 compares faculty experience of the 100 top-ranked institutions with faculty experience of remaining eligible institutions over a period of four years of India Rankings, i.e., 2017 to 2020. It can be observed that average no. of faculty with 8 years of experience in the 100 top-ranked institutions has decreased from 91 in 2015-2016 to 88 in 2018-2019 with marginal decrease of 3.3 per cent over a period of four years, whereas average no. of faculty with 8 years of experience in remaining institutions has decreased from 63 in 2015-2016 to 51 in 2018-2019, marking decrease of 19.05 per cent over a period of four years. Average No. of Faculty with 8-15 years of experience and >15 years of experience have increased by 15.58 per cent and 25.53 per cent in 100 top ranked institutions over a period of four years, respectively. Average No. of Faculty with 8 -15 years of experience and >15 years of experience have increased by 44.00 per cent and by 55.56 per cent in remaining institutions over this period, respectively.

Figure 4 depicts that while faculty with up to 8 years of experience has decreased from 54.15 per cent in 2015-16 to 41.27 per cent in 2018-2019, faculty with 8-15 years of experience and >15 years of experience have increased from 24.57 per cent and 21.27 per cent in 2015-16 to 30.92 per cent and 27.82 per cent in 2018-2019 respectively.

5.1.4 Financial Resources and their Utilisation

Financial resources and their utilisation is considered as an objective measure to assess ability of an HEI to maintain a proper environment for instruction and impact in academia. Financial resources including annual capital expenditure and average operational expenditure per student including salaries of faculty and staff. Research shows there is a linkage between academic outcomes and compensation paid to the faculty[24]. Expenditure per student is used as an input indicator by a total number of 4 out of 12 national rankings systems surveyed by Çakır *et al.*[23].

Table 5 and Fig. 5 provide data on median financial resources and their utilisation (FRU) per student for India rankings 2017 to India rankings 2020 for the 100 top-ranked engineering institutions in comparison to remaining engineering institutions. It can be observed that percentage of difference of median FRU per student between the 100 top-ranked and remaining engineering institutions vary from 200 per cent to 300 per cent in each ranking year. It may be noted that the median FRU per student has increased by 71.71 per cent and 47.18 per cent

Table 6. Students placed in jobs v/s students opted for higher studies in 100 top-ranked institutions in comparison to remaining eligible institutions from 2014-15 to 2018-19

Academic year	No. Of Insts.	Students placed in jobs		Students opted for higher studies		Avearage no. Of students placed in jobs			Average no. of students opted for higher studies		
		Top 100	Remaining	Top 100	Remaining	Top 100	Remaining	% Difference	Top 100	Remaining	% Difference
2014-15	860	54198	155590	7379	30167	542	205	164.39	74	40	85
2015-16	901	55579	199070	6886	34421	556	249	123.29	69	43	60.47
2016-17	1007	55036	210401	8897	35728	550	232	137.07	89	39	128.21
2017-18	1007	55873	210223	10432	35636	559	232	140.95	104	39	166.67
2018-19	1007	62122	229872	10102	35212	621	253	145.45	101	39	158.97

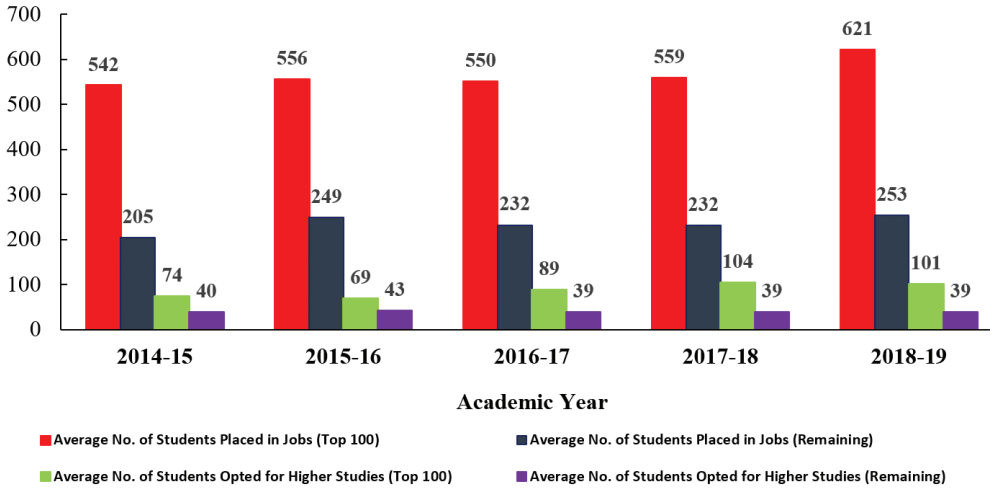


Figure 6. Students placed in jobs v/s students opted for higher studies in 100 top-ranked institutions in comparison to remaining institutions.

for the 100 top-ranked engineering institutions and remaining institutions over a period of four years, respectively.

Figure 5 provide data on median financial resources and their utilisation (FRU) per student for India rankings 2017 to India rankings 2020 in different categories and disciplines. It may be observed that FRU has increased consistently over a period of four years, although marginally, in all categories and subject domains except for Overall category and Pharmacy. The maximum median FRU is Rs. 81,603.00 in management with 5.57 per cent increase in FRU from 2017 to 2020.

5.2 Graduation Outcome

Output measures often utilised in the rankings include graduation rates, graduate degree level, and employment prospects of graduates, initial salary offered to them, and alumni satisfaction[25-26]. The "Graduation Outcome", the second broad categories of parameters is given weightage of 0.20. It consists of four parameters, namely placement and higher studies (40 marks); university examinations (15 marks); average salary (25 marks) and Ph.D. students graduated (20 marks).

5.2.1 Placement and Higher Studies

Although, placement services offered by HEIs is indeed one of the most important factors influencing the choices of applicants, but this parameter reflect efficiency of placement office of an institution instead of the actual quality of education[25]. Analysis of the UK data[27] suggested that there was no statistically significant difference between most UK universities in the pattern of graduate employment, except for the top 10 and bottom 10 universities that had meaningful difference in their results.

Moreover, given the fact that most of the data (except for publications and citations) is collected from HEIs themselves by various ranking system and no independent source of verification exists[28], several incidences of manipulation of data submitted to commercial league tables in an attempt to enhance their rankings[29] have been reported. It was further noted that while several colleges and universities in USA collect information on the outputs of academic programs in their graduate placement offices, this information is rarely made public nor is it systematically used by the institutions themselves to improve performance of their academic programs[25]. The office of NIRF (India rankings) has also received such complaints from competing HEIs, in spite of the fact that it is a mandatory requirement for all participating institutions to keep a copy of the data submitted by them to India Rankings (NIRF) on their web site for public viewing and feedback.

Table 6 and Fig. 6 depict average number of students placed in jobs as well as those who opted for higher studies in the 100 top-ranked institutions in comparison to remaining engineering institutions from India Ranking Years 2016 to 2020. It is evident that the 100 top-ranked institutions have done very well in placement in comparison to the remaining

Table 7. Average number of students graduated in the 100 top-ranked institutions as compared to average number of students graduated from remaining eligible engineering institutions

Academic year	No. of institutes	Number of graduated students				
		No. of students graduated from eligible institutions		Average number of students graduated from eligible institutions		% Difference
		Top 100	Remaining	Top 100	Remaining	
2014-15	901	71759	299936	718	374	91.98
2015-16	901	73058	358021	731	447	63.53
2016-17	1007	78366	386634	784	426	84.04
2017-18	1007	81239	387190	812	427	90.16
2018-19	1007	86695	394179	867	435	99.31

*As per data given for concerned ranking year

Table 8. Average salary of students placed in jobs in the 100 top-ranked institutions as compared to remaining eligible engineering institutions

India rankings year	Academic year	Salaries of graduates of			
		Top 100 institutes	Remaining eligible institutes	Difference in salary	
		Amount in INR			% Difference
2018	2014-15	526203	252892	273311	108.07
2019	2015-16	590282	268996	321286	119.44
2020	2016-17	598361	269803	328558	121.78
2020	2017-18	661383	281273	380110	135.14
2020	2018-19	718524	303786	414738	136.52
% increase in salary from AY 2014-15 to 2018-19		36.55	20.12		

institutions. The difference in placement in the 100 top-ranked institutions in comparison to remaining institutions vary from 123.29 per cent in 2015 – 2016 to 164.39 per cent in 2014 - 2015. Moreover, larger number of students opted for higher studies in the 100 top-ranked institutions in comparison to remaining institutions. The difference in average number of students in the 100 top-ranked institutions in comparison to remaining institutions who opted for higher studies vary from 60.47 per cent in 2015 - 2016 to 166.67 per cent in 2017 - 2018.

5.2.2 *University Examinations: Number of Student Graduated*

Dill and Soo[25] in their seminal article, elaborated that while the number of students who graduated from university is certainly a societally valued outcome, the fact that graduation rate can be independently controlled by each university is an issue that needs attention, i.e. graduation rates can be increased both by more effective teaching and student learning and by lowering academic standards. The issue of university grade inflation and inflation in honours degree awards has been raised both in the US and UK[30-31].

Table 7 depicts number of students graduated from the 100 top-ranked institutions as compared to number of students graduated from remaining eligible institutions from 2014-2015 to 2018-2019. It can be observed that average number of students graduated from the 100 top-ranked institutions as well as from remaining colleges have increased from 718 in to 867 (20.75 %) and from 374 to 435 (16.31 %) from 2014-2015 to 2018-2019 respectively. It may also be noted that number of students graduated from the 100 top-ranked institutions are, on average, 90 per cent more than the number of students graduated from remaining institutions.

5.2.3 *Average Salary*

Stock and Alston[32] observed that candidates from the top-ranked graduate programs in economics fare better in the job market in terms of their annual salary and job offers than their counterparts from lower-ranked programs using a sample of applicants to three state universities.

Higher weightage (40 %) given to the initial salary paid to MBA graduates and increase in salary in the Financial Times ranking has been criticised and experts have recommended either to eliminate this criteria entirely or reduce its weightage. An empirical study of Financial Times Global MBA rankings established that contrary to general believe, the ranking of US business schools have declined to the advantage of business schools in European and Asia in past one decade due to sustained rise in graduate salaries despite low aggregate economic demand and a rising supply of graduates[33]. In an experimental study conducted by Ortmans[34] constructed five case scenarios to analyse increasing impact of reducing salary weights up to its complete elimination in the Financial Times MBA Ranking 2019, assuming that everything else remains equal. The analysis revealed that although the top US schools retain their top 10 slots in most of the scenarios, business schools in US and India were at a disadvantage. Further reduction in the weight to salary increase was disadvantageous to business schools in China. In the most extreme scenarios, many schools in the Financial Times MBA ranking 2019 would drop out of the100 top-ranked institutions.

Table 8 provide a comparative view of average annual salary paid to the graduates of the 100 top-ranked institutions

Table 9. Number of full-time PhD students graduated from the 100 top ranked institutions as compared to remaining eligible engineering institutions

Academic year	No. of eligible institutions	Full-time PhD students graduated in				
		Top 100 institutions	Remaining institutions	All eligible institutions	% In top 100 institutions	% In remaining institutions
2014-15	901	2653	295	2948	89.99	10.01
2015-16	860	2784	364	3148	88.44	11.56
2016-17	1007	3299	585	3884	84.94	15.06
2017-18	1007	4022	776	4798	83.83	16.17
2018-19	1007	4355	1013	5368	81.13	18.87
Total		17113	3033	20146		

Table 10. Number of students in engineering discipline in the 100 top-ranked institutions as compared to no. of students in remaining eligible institutions

Regional distribution of students	Academic year 2015-2016 (India rankings 2017)				Academic year 2016-2017 (India rankings 2018)				Academic year 2017-2018 (India rankings 2019)				Academic year 2018 - 2019 (India rankings 2020)			
	No. of students in institutions				No. of students in institutions				No. of students in institutions				No. of students in institutions			
	Top 100	Remaining	% Top 100	% Remaining	Top 100	Remaining	% Top 100	% Remaining	Top 100	Remaining	% Top 100	% Remaining	Top 100	Remaining	% Top 100	% Remaining
Within state	266787	1510968	55.37	89.74	219018	1475096	49.93	89.14	214106	1573914	48.26	87.44	200857	1653341	41.95	87.98
Outside state	207005	166821	42.96	9.91	211576	174424	48.24	10.54	220582	218541	49.72	12.14	267762	218072	55.92	11.60
Outside country	8039	5893	1.67	0.35	8041	5282	1.83	0.32	8923	7546	2.01	0.42	10230	7732	2.14	0.41
Total	481831	1683682			438635	1654802			443611	1800001	100.00	100	478849	1879145	100.00	100

with average annual salary paid to the graduates of remaining eligible institutions over a period of five years of India Rankings, i.e. 2016 to 2020.

It can be observed that average salary offered to the graduates of the 100 top-ranked institutions was higher by 108.07 per cent as compared to the average annual salaries paid to the graduates of remaining eligible institutions in the 2014-2015. Moreover, salary offered to the graduates of the 100 top-ranked institutions has registered an increase of 36.55 per cent in comparison to 20.12 per cent for graduates of remaining institutions over a period of five years, i.e. from 2014-15 to 2018-2019. difference in increase in salary between graduates of the 100 top-ranked institutions and graduates of remaining eligible institutions grew every year, i.e. from 108.07 per cent in 2014-2015 to 136.52 per cent in 2018-2019.

5.2.4 *Ph.D. Students Graduated*

Number of Ph.D. students graduated can be considered as an objective measure to assess ability of a HEI to attract doctoral students and provide them guidance and environment to complete their Ph.D. program. Number of accredited doctoral programs offered by a university is used as an input indicator by a total no. of 4 out of 12 national rankings systems surveyed by Çakır *et al.*[23].

Table 9 depict number of full-time Ph.D. students graduated from the 100 top-ranked institutions ranked in India Rankings as compared to remaining engineering applicant institutions. It can be seen from the data that 81.13 per cent of full-time Ph.D. students graduated from the 100 top-ranked institutions as compared to 18.87 per cent from remaining institutions in the 2018 -2019. It can also be observed that number of full-time Ph.D. has increased from 10.01 per cent in 2014-2015 to 18.87 per cent in 2018-2019 in remaining institutions, whereas number of full-time Ph.D. from the 100 top-ranked institutions ranked in India Rankings has decreased from 89.99 per cent in 2014-2015 to 81.13 per cent 2018-2019.

5.3 Outreach and Inclusivity

The ranking framework has identified between 16-18 parameters (depending upon subject domains / categories being ranked), several of these parameters are common to those employed globally and serve as pointers to ambience for teaching, learning and research. However, there are a few India-centric parameters, reflecting aspirations of the rising numbers of our young people enrolled into higher education institutions. Country-specific parameters relevant to the Indian situation include regional diversity, outreach, gender equity and inclusion of disadvantaged sections of the society. Except for

Table 11. Gender distribution among students in the 100 top-ranked institutions and remaining eligible institutions

Academic year (India rankings year)	Number of inst.	Average number of students in				Per cent of students in			
		Top 100 institutes		Remaining institutes		Top 100 institutes		Remaining institutes	
		Male	Female	Male	Female	Male	Female	Male	Female
2015-16 (2017)	946	3537	1281	1355	635	73.41	26.59	68.09	31.91
2016-17 (2018)	860	4386	3300	2177	1476	57.06	42.94	59.59	40.41
2017-18 (2019)	901	4436	3343	2247	1542	57.03	42.97	59.3	40.7
2018-19 (2020)	1007	4788	3603	2072	1416	57.06	42.94	59.4	40.6

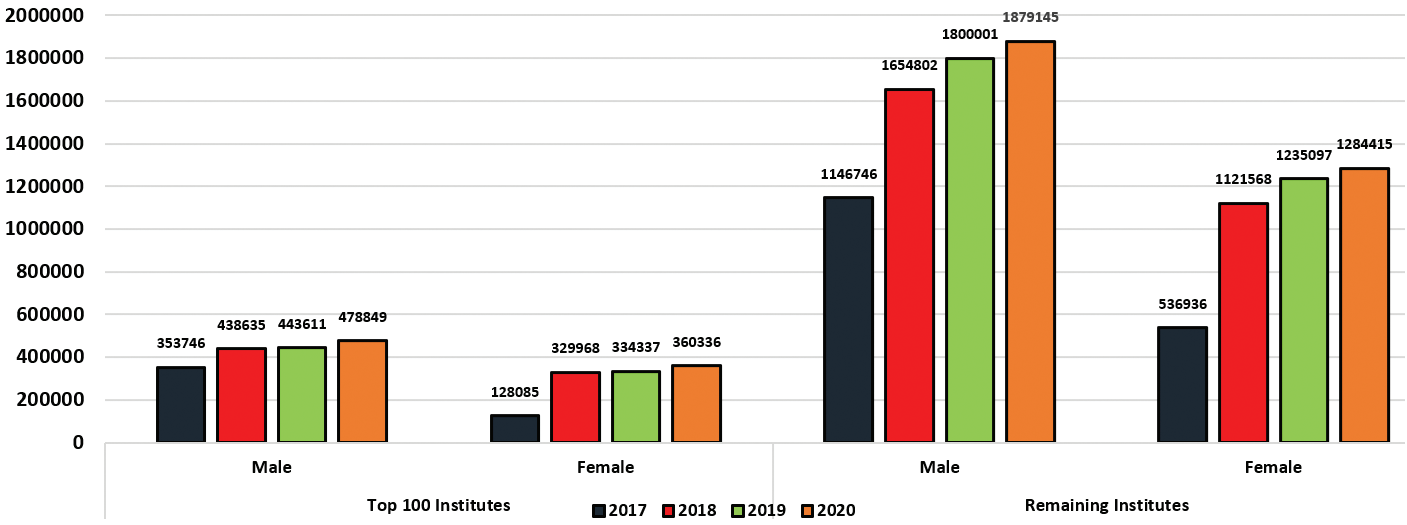


Figure 7. Gender distribution among students in the 100 top-ranked institutions.

gender equity that is being used for ranking of HEIs at national level, remaining three parameters are India-centric and are not being used by other ranking systems. The "outreach and inclusivity", the third broad categories of parameters, is given weightage of 0.10. It consists of four sub-parameters, namely region diversity (30 marks); women diversity (30 marks); economically and socially challenged students (20 marks); and facilities for physically challenged students (20 marks).

5.3.1 Region Diversity

Higher education institutions are required to be culturally responsive in increasingly diverse and multicultural society. The success of an institution and overall growth of education system of a country depends on the way it values, fosters, supports and encourages cross-cultural diversity of students and other stakeholders of education. Empirical studies show that students tend to gain a more comprehensive understanding of the subject matter when working and learning with people from diverse origin, backgrounds and cultures, which has a positive personal and academic influence on them. Exposure to diversity helps them to open up to new communities and cultures, examine an issue with multiple perspectives, embrace variety, varied beliefs and attitudes. It prepares them to face the real world and work and thrive in a global society with diverse work force, develop sensitivity and respect for human differences, and ability to associate with people from various backgrounds. Learning in such an environment facilitates introspection and self-awareness by allowing one to compare and contrast life experiences with mixed backgrounds and circumstances[35].

Table 10 provides data on regional distribution of students from within state, outside the state in India as well as from outside the country. It can be observed from the data that in the 100 top-ranked engineering institutions, students from within the state and outside the state are evenly distributed, i.e. nearly 50 per cent from within the state and 50 per cent from outside the state. Moreover, per cent of students from within the state have decreased from 55.37 per cent in 2015-2016 to 41.95 per cent in 2018-2019, whereas per cent of students from outside the state have increased from 42.96 per cent in 2015-2016 to 55.92 per cent in 2018-2019. On the contrary, nearly 90 per cent of students in remaining engineering institutions are from within the state and only ~10 per cent of the students are from other states, although per cent of students from within the state have decreased marginally from 89.74 per cent in 2015-2016 to 87.98 per cent in 2018-2019 in remaining engineering institutions also. Per cent of students from outside the country in miniscule, i.e. 1.67 per cent in the 100 top-ranked institutions and 0.35 per cent in remaining institutions in 2015-2016 that has registered a marginal increase of 2.14 per cent in the 100 top-ranked institutions and 0.41 per cent in remaining institutions in 2018-2019. Even regional distribution of

Table 12. Gender distribution among faculty in the 100 top-ranked institutions and remaining eligible institutions

Academic year (India rankings year)	No. of inst.	Average number of faculty in				Per cent of faculty in			
		Top 100 institutes		Remaining institutes		Top 100 institutes		Remaining institutes	
		Male	Female	Male	Female	Male	Female	Male	Female
2015-16 (2017)	946	231	102	105	60	69.37	30.63	63.64	36.36
2016-17 (2018)	860	234	101	111	64	69.85	30.15	63.43	36.57
2017-18 (2019)	901	237	101	109	63	70.12	29.88	63.37	36.63
2018-19 (2020)	1007	250	108	98	57	69.83	30.17	63.23	36.77

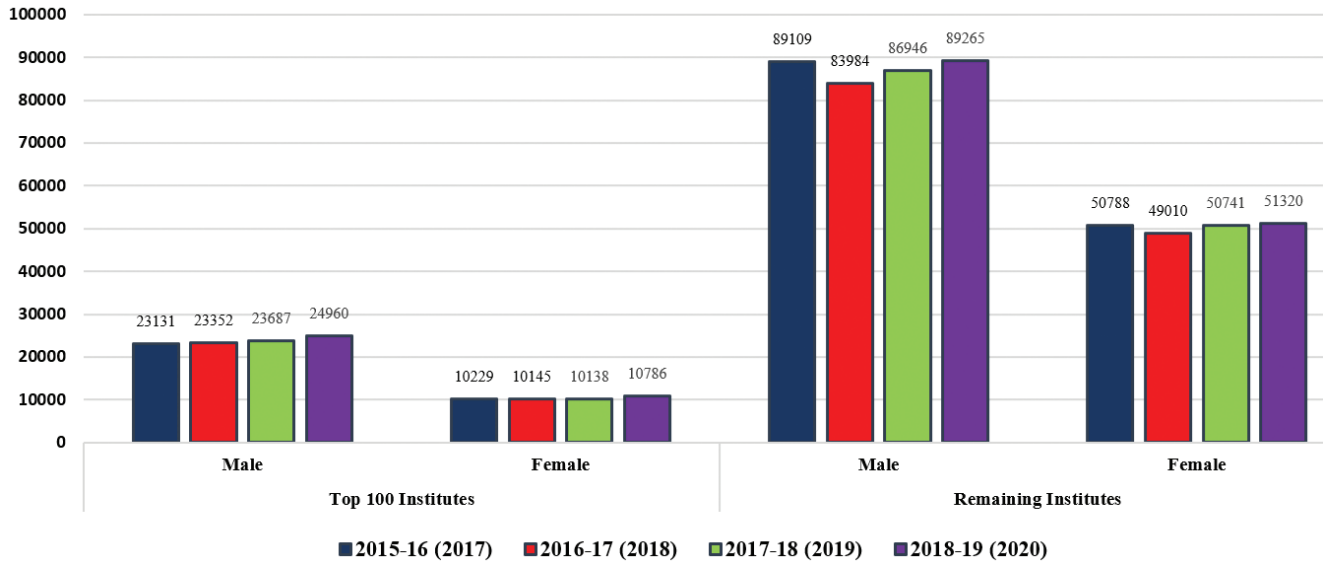


Figure 8. Gender distribution among faculty in the 100 top-ranked institutions and remaining eligible institutions.

students in the 100 top-ranked institutions can be attributed to the fact that students are admitted to these institutions through a stiff national-level competitive examination and successful candidates are admitted to these institutions based on their rank in competitive examination and engineering programs that they choose. As such, there is no assurance that a student will get admission to college within his / her state. Remaining colleges may also have competitive entrance examination, but there is state-imposed regulation that necessitates colleges to reserve seats for students from within the state, that, in turn, tilt the balance in favour of students from within the state.

5.3.2 Women Diversity

Gender gap in academic leadership is a global phenomenon, however, this gap is glaring in India as compared to developed countries where female participation at the leadership level is more than 17 per cent[36]. On the contrary, currently only 6.67 per cent Indian academic institutions (54 out of 810) are headed by females[37]. In a survey conducted across six states and one union territory of India, faculty from various disciplines were interviewed to find gender diversity awareness amongst them. It was found that the participants of this study had limited their perception of gender diversity to faculty recruitment. The participants were unaware of measures that are required as continued framework for ensuring the success of women at the workplace, such as retention of female faculty, representation of women in certain academic fields and in top management, compensation and benefits and best practices in ensuring gender diversity within the college campus[37].

5.3.2.1 Gender Distribution among Students in the 100 Top-Ranked Institutions

Table 11 and Fig. 7 depict gender distribution of students in top 100 engineering institutions ranked in India Rankings and remaining eligible engineering institutions from 2015-2016 to 2018-2019. Male-female distribution of students amongst engineering institutions in the 100 top-ranked institutions as well as remaining engineering institutions has increased from around 70 per cent (male) and 30 per cent (female) in 2015-2016 to around 60 per cent (male) and 40 per cent (female) in all subsequent academic years.

5.3.2.2 Gender Distribution among Faculty in the 100 Top-Ranked Institutions

Unlike students whose course completion periods are short (2–5 years typically), faculty typically stay in HEIs over a sustained and substantial period of time to teach, develop academic, research programs and conduct relevant research to push the frontiers of knowledge, enforce campus policies and eventually live by the established university standards[38].

Table 13. Economically backward category and socially challenged students in the 100 top-ranked institutions v/s remaining eligible institutions

Ranking year (academic year)	No. of eligible insts.	Per cent of students in					
		100 Top-ranked institutions			Remaining institutions		
		EBC	SC	Others	EBC	SC	Others
IR 2017 (2015-16)	946	19.02	36.96	44.02	21.99	39.38	38.63
IR 2018 (2016-17)	860	26.67	38.98	34.35	30.76	40.83	28.42
IR 2019 (2017-18)	901	15.32	39.03	45.65	23.40	39.78	36.82
IR 2020 (2018-19)	1007	17.09	37.09	45.82	22.23	41.35	36.41
Average IR 2017-20		19.53	38.02	42.46	24.60	40.33	35.07

Abbreviations: EBC: Economically Backward Category; SC: Socially Challenged

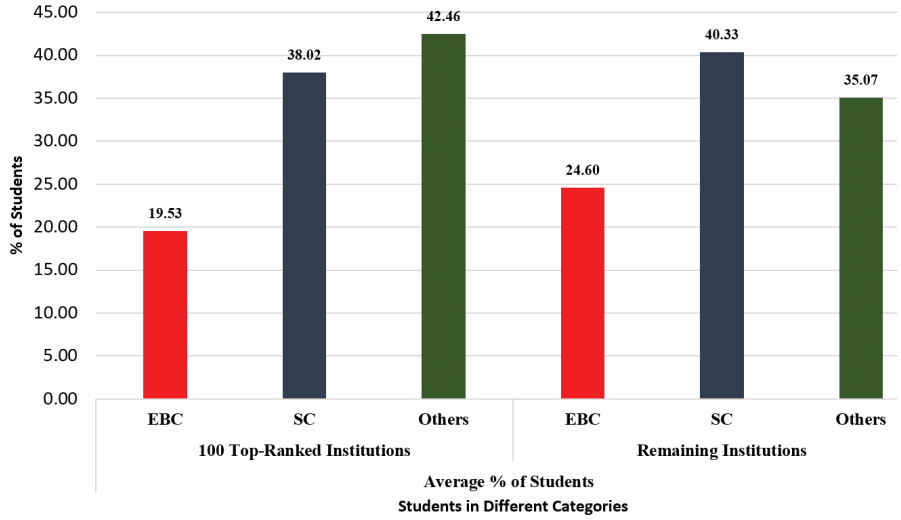


Figure 9. Average per cent of students in different categories in the 100 top-ranked institutions and remaining eligible institutions.

Moreover, academicians in HEIs are instrumental in preparing students for the job market, mentoring them and be their role models.

Table 12 and Fig. 8 depict gender distribution amongst faculty in the 100 top-ranked engineering institutions ranked in India Rankings and remaining eligible engineering institutions from 2015-2016 to 2018-2019. Male - female distribution of faculty amongst engineering institutions in the 100 top-ranked institutions is around 70 per cent (male) and 30 per cent (female) throughout all the four Academic Years whereas this proportion remained static at around 63 per cent (male) and 36 per cent (female) in remaining institutions.

5.3.3 Economically and Socially Challenged Students

Table 13 and Fig. 9 provides data on average per cent of Economically Backward Category (EBC), Socially Challenged (SC) and Other Backward Categories (OBC) of students admitted to the 100 top-ranked engineering institutions as well as remaining eligible engineering institutions. It can be observed that both 100 top-ranked institutions as well as remaining institutions admit all the three categories of students and variation in per cent of students admitted in different categories is less than 5 per cent.

5.4 Perception

Perception, variably called reputation, prestige or opinion, is the most controversial as well as the most prominent measure used in global ranking of universities, specially THE and QS. The amount of external research funding received by a university is an influential indicator of academic prestige in university league tables. Universities are, therefore, consistently seeking to increase their potential for research funding by investing in Ph.D. programs, in laboratories, libraries, computer facilities, and research management as well as by attracting more research-oriented faculty[26]. It was observed that in some disciplines reputation has a strong impact on the ability of the universities to get external research grants, whereas in others, number of PhDs and / or number of publications. Luhmann pointed out that the past reputation (Halo effect) helps to get resources and funds, better positions and better possibilities to publish[39].

Table 14 provides data on academic perception received from peers in their respective disciplines for various categories and subject domains of India Rankings for the four ranking years, i.e. 2017 to 2020. The 100 top-ranked institutions of each category have received around 75 per cent - 90 per cent of responses from peers, whereas around 10 per cent to 25 per cent of responses are received by remaining institutions in each category.

Table 15 provides data on employer's perception received from employers in their respective disciplines for various categories and subject domains of India Rankings for four years, i.e. 2017 to 2020. It can be observed from the table given below that the 100 top-ranked institutions have received nearly 65 per cent to 90 per cent responses in four categories / subject domains, namely Overall, Engineering, Pharmacy and Management. Remaining eligible institutions received the balance of 10 per cent to 35 per cent responses.

6. MAJOR OBSERVATIONS

Major Observations on the five years of data from India rankings 2016 to 2020 are as follows:

- Number of students enrolled at different levels have increased consistently in the 100 top-ranked HEIs with maximum increase at Ph.D. level and overall increase of 10.17 per cent over a period of four years, i.e. from 2017 to 2020. Although overall students strength in remaining institutions have also registered an increase of 12.47 per cent, however, student strength at Ph.D. & PG level in remaining institutions has decrease by 28.11 per cent. Since admission to the 100 top-ranked institutions at

Table 14. Per cent of votes for academic perception received by the 100 top-ranked institutions v/s remaining institutions

India rankings year	Engineering		Overall		Pharmacy		Management	
	Per cent of responses for		Per cent of responses for		Per cent of responses for		Per cent of responses for	
	Top 100 Inst.	Remaining Inst.	Top 100	Remaining Inst.	Top 100	Remaining Inst.	Top 100 Inst.	Remaining Inst.
2017	75.89	24.11	89.4	10.6	86.6	13.4	88.19	11.81
2018	82.44	17.56	81.78	18.22	86.45	13.55	87.59	12.41
2019	82.77	17.23	81.13	18.87	85.17	14.83	87.54	12.46
2020	79.9	20.1	80.9	19.1	86.07	13.93	85.78	14.22

Table 15. Per cent of votes for employer's perception received by the 100 top-ranked institutions v/s remaining institutions

India rankings year	Engineering		Overall		Pharmacy		Management	
	Per cent of responses for		Per cent of responses for		Per cent of responses for		Per cent of responses for	
	Top 100 Inst.	Remaining Inst.	Top 100 Inst.	Remaining Inst.	Top 100 Inst.	Remaining Inst.	Top 100 Inst.	Remaining Inst.
2017	86.34	13.66	74.06	25.94	90.14	9.86	83.18	16.82
2018	71.56	28.44	72.77	27.23	94.29	5.71	88.15	11.85
2019	66.91	33.09	64.68	35.32	83.02	16.98	77.84	22.16
2020	76.03	23.97	65.33	34.67	69.57	30.43	83.33	16.67

undergraduate level is through national level competitions, students may not have option to choose top-ranked institutions. However, it is comparatively easy for students to get admissions in the top-ranked HEIs at PG and Ph.D. levels, which explains decline in student strength at PG and Ph.D. level in remaining institutions. Popularity of India Rankings may have played its role here.

- Faculty-student ratio (FSR) across eligible institutions in engineering category from 2017 to 2020 has improved over past four years, i.e. from 2017 to 2020. Increase in FSR between 11 to 40 reveals that a large number of institutions are trying for a better and acceptable FSR, possibly both for improving their ranking as well as for accreditation and approval by the All India Council for Technical Education (AICTE).
- Average number of faculty with Ph.D. degree has increased in the 100 top-ranked institutions as well as in remaining institutions. However, per cent of increase in faculty with PhD. in remaining institutions is much higher. While faculty with Ph.D. have increased gradually every year, faculty with Master's degree have registered gradual decline every year from 2015-16 to 2018-19.
- Average no. of faculty with 8 years to 15 years and more than 15 years of experience have increased both in the 100 top-ranked institutions as well as in remaining institutions with corresponding decrease in average number of faculty with 8 years of experience. However, per cent of decrease in number of faculty with 8 years of experience and per cent of increase in faculty with 8 to 15 years and more than 15 years was higher in remaining institutions in comparison to decrease / increase in experiences of faculty in the 100 top-ranked institutions.
- Expenditure per students in the 100 top-ranked institutions is three times higher than expenditure per students in remaining engineering institutions. Moreover, increase in expenditure per students from 2017 to 2020 is much higher in the 100 top-ranked institutions in comparison to expenditure per students in remaining engineering institutions.
- The 100 top-ranked institutions have done very well in placement of their students in comparison to the remaining institutions. Larger number of students opted for higher studies in the 100 top-ranked institutions in comparison to remaining institutions.
- Average number of students graduated from the 100 top-ranked institutions as well as from remaining institutions have registered an increase of 20.75 per cent and 16.31 per cent from 2014-2015 to 2018-2019 respectively. It may be noted that number students graduated from the 100 top-ranked institutions on average is 90 per cent more than the number of students graduated from remaining institutions.
- Average salary offered to the graduates of the 100 top-ranked institutions was higher by 108.07 per cent as compared to the average annual salaries paid to the graduates of remaining eligible institutions in the 2014-2015. Moreover, salary offered to the graduates of the 100 top-ranked institutions has registered an increase of 36.55

per cent in comparison to 20.12 per cent for graduates of remaining institutions over a period of five years, i.e. from 2014-15 to 2018-2019.

- 81.13 per cent of full-time Ph.D. students graduated from the 100 top-ranked institutions as compared to 18.87 per cent from remaining institutions in the 2018 -2019. Moreover, number of full-time Ph.D. has increased from 10.01 per cent in 2014-2015 to 18.87 per cent in 2018-2019 in remaining institutions, whereas number of full-time Ph.D. from the 100 top-ranked institutions ranked in India Rankings has decreased from 89.99 per cent in 2014-2015 to 81.13 per cent 2018-2019.
- Students from within the state and outside the state are evenly distributed in the 100 top-ranked engineering institutions, i.e. nearly 50 per cent from within the state and 50 per cent from outside the state. Moreover, while the per cent of students from within the state have decreased with corresponding increase in per cent of students from outside the state over a period of four years, i.e. from 2015-2016 to 2018-2019. On the contrary, nearly 90 per cent of students in remaining engineering institutions are from within the state and only ~10 per cent of the students are from other states. However, per cent of students from within the state have decreased marginally from during this period in remaining engineering institutions.
- Male-female distribution of students amongst engineering institutions in the 100 top-ranked institutions as well as remaining engineering institutions has increased from around 70 per cent (male) and 30 per cent (female) in 2015-2016 to around 60 per cent (male) and 40 per cent (female) in all subsequent academic years.
- Male-female distribution of faculty amongst engineering institutions in the 100 top-ranked institutions is around 70 per cent (male) and 30 per cent (female) throughout all the four Academic Years whereas this proportion remained static at around 63 per cent (male) and 36 per cent (female) in remaining institutions.
- The 100 top-ranked institutions of each category have received around 75-90 per cent of responses from peers, whereas around 10-25 per cent of responses are received by remaining institutions in each category during India Rankings Years 2017 to 2020.
- The 100 top-ranked institutions have received nearly 65 per cent to 90 per cent responses in four categories / subject domains, namely Overall, Engineering, Pharmacy and Management. Remaining eligible institutions received the balance of 10 per cent to 35 per cent responses during India Rankings Years 2017 to 2020.

7. CONCLUSIONS

This article analyses data on five years of India Rankings to assess its impact on performance parameters of institutions of higher education on four (out of five) broad categories of parameters, namely:

- Teaching, Learning and Resources;
- Graduation Outcome;
- Outreach and Inclusivity; and
- Perception.

The analysis on data on four years of India Rankings, i.e. 2017 to 2020 on various performance parameters of HEIs provides an interesting insight and reveals that participating institutions are making strenuous effort to improve their performance on various parameters or sub-parameters identified under NIRF. Moreover, the analyses reflect that performance of remaining eligible institutions has improved on most of the ranking parameters in comparison to the 100 top-ranked institutions over a period of four years of ranking, i.e. from 2017 to 2020.

Ranking system cannot measure quality of education and research in absolute term, however, it essentially serve as indicators to various aspects of quality in higher education. As such, while results of ranking on different parameters can be used by institutions for improving their performance on parameters that indicates deficiency as is observed in the analyses given above. This study reflect that ranking has influenced the performance of HEIs in a positive way. Taylor and Braddock[18] stated that ranking systems should not dictate university policy, either at a national or institutional level, but should be used as a source of information for guiding policies that are decided according to the needs of the university's own community, traditions, market niche, national role and so on.

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