

Measuring the Performance of Higher Education Institutions in India: A Bird's Eye view of the National Institutional Ranking Framework

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Abstract

There has been a significant upsurge in the number of higher education institutions in India. Presently there are 993 higher education institutions in India, including universities, IIT's, IIM's, IIIT's, IISER's, and a set of institutes of national importance. However, there was no formal process in India to measure the impact or performance of these higher education institutions. This paper gives a bird's eye view of the national institutional ranking framework (NIRF)—a recent initiative taken by the Government of India. The NIRF is a formal process to rank the higher education institutions in India after analyzing their performance basing on five parameters—teaching, learning, and resources; research and professional practice; graduation outcomes; outreach and inclusivity; and peer perception. We have collected the NIRF ranking data of three consecutive years (2017, 2018, and 2019) and found that 27 institutions have appeared in all these three years. We have computed panel regressions (fixed effects and random effects models) to examine the determinants of the overall ranking score obtained by these 27 institutions and applied the Hausman test to choose an appropriate model. The Hausman test statistic not being significant, we accept the random effect model as the final model. The results of the random effects panel model indicate that three parameters—teaching, learning, and resources; research and professional practice; and graduation outcomes—determine the total score and ranking. The advantages and shortcomings of the NIRF ranking system are discussed along with recommendations.

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I. Introduction

Higher education in India has seen remarkable growth since independence, both quantitatively and qualitatively. The government has promoted and supported the higher education sector with steady financial allocation, which has led to significant progress in this sector. Through

various 5-year Plans, until recently, the government made higher education a priority area for human capital formation aimed at sustainable economic growth and social welfare. At present the number of higher education institutions in India has grown to 993 including universities, IIT's, IIM's, IIIT's, IISER's, and a set of institutes

of national importance [1]. In India, the University Grants Commission (UGC) Act defines the role of UGC in terms of providing funds, coordination, determination, and maintenance of standards in institutions of higher education [2]. Besides, an important task for the UGC is to notify and keep updating the list of fake universities in India as the commercialization of education has also led to the menace of fake universities. The UGC has constituted a body called National Assessment and Accreditation Council for Accreditation (NAAC) of all colleges and universities in terms of quality and impact of education being offered [3].

Besides the UGC, the recognition or accreditation of various courses of study is under the control of following few professional bodies, such as All India Council for Technical Education (AICTE) to be superseded by the National Board of Accreditation (NBA) for technical and management colleges for all technology- and management-related courses, Indian Council of Agricultural Research (ICAR) for all agriculture, veterinary, and allied courses, Bar Council of India (BCI) for law-related courses, National Council for Teacher Education (NCTE) for education-related courses, National Medical Commission (NMC) for medical-related courses, Pharmacy Council of India (PCI) for pharmacy-related courses, Indian Nursing Council (INC) for nursing-related courses, Dental Council of India (DCI) for dental science-related courses, Central Council of Homoeopathy (CCH) for homeopathy-related courses, and Rehabilitation Council of India (RCI) for the courses related to rehabilitation and special education.

We have referred All India Survey on Higher Education Report for 2018-19 (AISHE Report 2018-19) to analyze the pattern of growth of higher education institutions in India [1]. Primarily, this paper gives a bird's eye view of the national institutional ranking framework (NIRF)—a recent initiative taken by the Government of India to rank the higher education

institutions in India. We have collected the NIRF ranking data of three consecutive years (2017, 2018, and 2019) to examine the determinants of the overall ranking score of the institutions. Moreover, the advantages and shortcomings of the NIRF ranking system are discussed along with recommendations.

II. The pattern of growth of higher education institutions in India: AISHE Report 2018-19

Since independence, there has been a substantial increase in the number of colleges and universities. According to the AISHE Report 2018-19 (as on 30-9-18), the number of colleges has grown from 578 to 39,931 while the number of universities has increased from 28 to 993 from 1950-51 to 2018-19. The growth of universities and colleges is presented in Table 1 and Table 2.

Table 1
The number of universities and colleges in India as per AISHE Report 2018-19

Period	Universities ¹	Colleges
1950-51	28	578
1960-61	45	1,819
1970-71	93	3,227
1980-81	123	4,738
1990-91	184	5,748
2000-01	266	11,146
2018-19	993	39,931

*Note.*¹Universities include central, state, private, and deemed-to-be universities as also institutions of national importance established both by the central and state governments.

Table 2
Types of universities in India as per the AISHE Report 2018-19

Type	Number	Type	Number
1. State Universities	435 (43.83)	1. General	548 (55.19)
2. Private Universities	385 (38.77)	2. Technical	142 (14.30)
3. Central Universities	46 (4.63)	3. Agricultural	63 (6.34)

4. Deemed-to-be Universities	127 (12.79)	& Allied 4. Medical	58 (5.84)
IIT	23	5. Law	23 (2.32)
IIM	19	6. Sanskrit	13 (1.31)
NIT	31	7. Languages	9 (0.91)
IIIT	18	8. Others	106 (10.67)
IISER	5		
Total	993	Total	993

Position of Indian higher education institutions in global ranking

There are several global ranking systems. The Quacquarelli Symonds World University Rankings (QS-Ranking) is an annual publication of university rankings, which comprises the global overall and subject rankings (which name the world's top universities for the study of 48 different subjects and five composite faculty areas), alongside our independent regional tables (such as Asia, Latin America, Emerging Europe, and Central Asia and the Arab Region). The QS-Ranking is the most widely read university rankings in the world [4].

Similarly, the Times Higher Education World University Rankings (THE-Ranking) provides data to judge university excellence in every continent across the world [5]. The company is very influential in university ranking all over the world. It also has almost five decades of experience in terms of its source and expertise to analyze the higher education sector. As claimed, THE-Ranking possesses unparalleled expertise on the trends underpinning global university performance. THE-Ranking data and benchmarking tools are used by many of the world's most prestigious universities to analyze, set and achieve their strategic goals

We also come across another annual publication of world university ranking system, i.e., the Shanghai Ranking [6]. The league table was originally compiled and issued by Shanghai Jiao Tong University in 2003, making it the first

global university ranking with multifarious indicators.

It is observed that in spite of such a massive growth of higher education institutions in India, none of the Indian Universities figure in the list of top 200 World Universities in QS or Times HE Ranking. This is a matter of concern for India in terms of visibility and the global perception in the quality of education being imparted at Indian Universities.

The Government of India is very particular about the quality and outcomes of the institutions of higher education. Towards this, recently the Government of India has introduced the National Institutional Ranking Framework (NIRF) in 2015 for the annual ranking of higher education institutions in various categories. Now, the Government has also recognized 20 world-class Institutions of Eminence (IoE) (10 Public and 10 Private Institutions) for which applications have been invited under UGC (World Class Institutions Deemed-to-be-Universities) Regulations, 2016 and the process is complete. The IoEs should preferably be multi-disciplinary or interdisciplinary and have both teaching and research focus of exceptionally high quality. They should achieve a student enrollment of at least 20,000 over 15 years. It should be considered as one of the top 500 in any of the world-renowned ranking frameworks within the first 10 years and be in the top 100 eventually over time.

III. NIRF ranking: Parameters

Before starting of the NIRF ranking by the Government of India in 2015, there was no objective assessment system with standard criteria for ranking of educational institutions in India. Nevertheless, in India, there are certain private agencies that are known for ranking of higher educational institutions, such as the India Today, Outlook, and Frontline. In addition to these, various leading newspapers like the Times of India, the Hindu, and the Hindustan Times also publish the ranking of the educational institutions

in India. These rankings help the potential candidates to choose a university or institution in general and in specific disciplines.

According to the NIRF Report 2018-19, the National Institutional Ranking Framework (NIRF) was approved by the Ministry of Human Resource Development (MHRD) and launched on 29 September 2015. The system provides a country-wide approach for rating institutions [7].

The methodology builds on the broad understanding reached by a core committee set up by the MHRD from the overall recommendations to define the basic criteria for ranking different universities and institutions [8]. The five major parameters and their domains are presented in Table 3.

Table 3 Five major criteria of NIRF

SN	Parameters	Domains
1	Teaching, Learning & Resources (TLR)	Student Strength including doctoral students (SS) Faculty-student ratio with emphasis on permanent faculty (FSR) Combined metric for Faculty with Ph.D. (or equivalent) and experience (FQE) Financial resources and their utilization (FRU)
2	Research and Professional Practice (RPP)	Combined metric for publications (PU) Combined metric for quality of publications (QP) IPR and patents: Published and granted (IPR) The footprint of projects and professional practice (FPPP)
3	Graduation Outcomes (GO)	Metric for university examinations (GUE) Metric for number of Ph.D. students graduated (GPHD) Combined metric for placement and higher studies (GPH) Median salary (GMS)
4	Outreach and Inclusivity (OI)	Percentage of students from other states/countries (Region Diversity RD) Percentage of women (Women Diversity WD) Economically and socially challenged students (ESCS) Facilities for physically challenged students (PCS) Perception (PR) ranking
5	Peer Perception	Academic peers and employers (PR)

Ranking parameters and weightages: Each of the parameters is scored out of 100 marks and then weightages are given to prepare a list for Total score. The weightages are for Teaching, learning, and resources = 30%, Research, and professional practice = 30%, Graduation outcomes = 20%, Outreach and inclusivity = 10%, and Perception = 10% [8]. This way of ranking institutions certainly yields an idea to the public in terms of the performance of Indian higher education institutions based on objective criteria. This also helps the relative assessment of a higher education institution over the years. The higher education institutions also know their strengths and weaknesses from the ranking and its parameters across the years. Goal setting and

undertaking new programs, courses, and research projects become easier based on this assessment.

NIRF ranking from 2017–2019: Determinants of overall ranking

The NIRF releases the ranking under the following categories: Overall, University, Engineering, College, Management, Pharmacy, Law, Architecture, and Medical. From the NIRF ranking data of three years, i.e., 2017, 2018, and 2019 under the overall category, it is observed that there are 27 institutions out of the top 100, which have figured in all three consecutive years [7]. We have calculated the mean score under each dimension out of above mentioned three years and presented in Table 4. The other institutions have not appeared in all three years. On comparing the

range of scores under different parameters in Table 5, it is observed that the range for

perception is the highest.

Table 4 Mean scores of the institutions under respective parameters for three consecutive years (2017, 2018, and 2019)

SN	Institute	Mean scores					
		TLR	RPP	GO	OI	PER	T-Score
1	IISc Bangalore	83.60	89.30	80.67	51.22	94.44	82.57
2	IIT Madras	78.85	79.18	85.50	69.21	83.15	79.75
3	IIT Bombay	74.32	82.70	77.97	55.00	83.32	76.53
4	IIT Delhi	69.04	76.71	73.32	62.74	76.15	72.28
5	IIT Kharagpur	63.46	73.89	85.09	63.21	68.32	71.38
6	Jawaharlal Nehru University	71.19	39.47	99.23	79.20	49.61	65.93
7	IIT Kanpur	67.91	66.79	63.69	50.07	68.96	65.05
8	IIT Roorkee	61.81	61.09	85.27	64.33	37.87	64.15
9	Banaras Hindu University	60.91	49.07	95.38	57.70	44.97	62.33
10	IIT Guwahati	73.86	52.06	71.78	64.29	34.38	62.00
11	Anna University	53.32	56.48	78.84	55.24	56.63	59.89
12	University of Hyderabad	68.82	43.96	82.29	64.20	28.48	59.56
13	Jadavpur University	53.37	55.35	91.03	44.77	38.71	59.18
14	University of Delhi	47.96	56.19	84.79	55.09	35.01	57.22
15	Aligarh Muslim University	68.51	36.15	87.89	52.71	20.46	56.29
16	Jamia Millia Islamia	68.35	31.08	84.14	74.79	11.92	55.33
17	IIT Hyderabad	68.71	34.72	65.17	62.69	26.85	53.02
18	IISER, Pune	67.01	34.51	57.09	66.36	27.58	51.27
19	NIT Tiruchirappalli	54.26	33.48	70.93	65.79	36.69	50.76
20	IISER, Mohali	61.71	21.39	57.22	72.17	13.88	44.98
21	IIT (Indian School of Mines)	49.74	43.16	72.49	55.86	15.96	49.55
22	IIT (BHU), Varanasi	54.26	35.77	69.29	51.62	25.34	48.57
23	Andhra University	58.55	22.29	83.35	55.41	14.93	47.96
24	IIT Bhubaneswar	64.49	27.32	53.22	64.07	12.51	45.85
25	NIT Surathkal	48.76	27.74	70.62	55.15	25.13	45.10
26	IISER, Bhopal	58.83	25.43	60.65	67.57	6.26	44.79
27	Sri Venkateswara University	56.26	24.66	66.67	53.13	3.49	43.27

Note. TLR: Teaching Learning and Resources, RPP: Research and Professional Practice, GO:

Graduation Outcome, OI: Outreach and Inclusivity, PER: Perception, T-Score: Total Score

Table 5 Maximum and minimum scores under each parameter among 27 institutions and the difference of scores range

Parameters	Max. score	Min. score	Difference in score
TLR	83.60	47.96	35.64
RPP	89.30	21.39	67.91
GO	99.23	53.22	46.01

OI	79.20	44.77	34.43
PER	94.44	3.49	90.95
T-Score	82.57	43.27	39.30

Note. TLR: Teaching Learning and Resources, RPP: Research and Professional Practice, GO: Graduation Outcome, OI: Outreach and Inclusivity, PER: Perception, T-Score: Total Score

Further, we calculate the correlation matrix to see how these different scores are related that contribute to the final score. The correlation matrix is given below.

Table 6 Correlation matrix

	T-Score	TLR	RPP	GO	OI	PER
T-Score	—					
TLR	.67**	—				
RPP	.93**	.46**	—			
GO	.52**	.13	.36**	—		
OI	-.12**	-.07	-.27**	-.06	—	
PER	.91**	.48**	.91**	.33**	-.18**	—

Note. TLR: Teaching Learning and Resources, RPP: Research and Professional Practice, GO: Graduation Outcome, OI: Outreach and Inclusivity, PER: Perception, T-Score: Total Score
** $p < .01$.

The two variables—perception and research and professional practice—are positively associated with the total score and the correlations are more than 90%. Outreach and inclusivity is

observed to be negatively related to the total score, though of lower magnitude. Further, we try to see the dispersion in the panel across parameters both within and between in a panel setup.

Table 7
Observed variations ranking in parameters

Variable		Mean	Std. Dev.	Min	Max	Observations
TLR	Overall	63.25469	11.43047	40.04	84.56	N=81
	Between		9.252619	47.95667	83.60333	n=27
	Within		6.869131	45.02136	74.06136	T=3
RPP	Overall	47.40556	20.42806	17.55	91.08	N=81
	Between		20.21213	21.38667	89.30333	n=27
	Within		4.357591	30.98222	60.16222	T=3
GO	Overall	76.06025	12.42111	45.39	99.87	N=81
	Between		12.04163	53.22	99.23333	n=27
	Within		3.592803	64.22691	83.35691	T=3
OI	Overall	60.5042	10.53809	36	83.55	N=81
	Between		8.222847	44.77333	79.19667	n=27
	Within		6.717633	44.0642	75.49086	T=3
PER	Overall	38.55481	26.26782	1.94	100	N=81
	Between		25.7536	3.486667	94.44333	n=27
	Within		6.582689	22.78148	52.47148	T=3
T-Score	Overall	58.31679	11.54246	37.32	83.88	N=81
	Between		11.2015	43.26667	82.57333	n=27
	Within		3.300229	50.21679	64.72679	T=3

As pointed out earlier, perception seems to be playing a major role since its standard deviation is the highest as shown in the above table. We then run panel regressions to examine the relationship the different criteria variables have with total score since the total score determines the ranks of the institutions.

Panel data regressions relate to many cross-section units over time to study both dynamic and cross-sectional behavior. A balanced panel is one where one deals with the same number of observations on each unit so that the total number of observations is $n(T)$. From the point of view of econometric benefits panel data reduces multi-collinearity. It also enables one to

study the complex dynamic behavior, i.e. time and individual variations in behavior; usually unobservable in cross sections or aggregate time series. The panel data methods also provide a means of resolving or reducing the magnitude of a key econometric problem, namely the effects of missing or unobserved variables (omitted variable bias). It helps us to control for individual heterogeneity.

Both fixed effects and random effects panel regressions are run for 27 institutions for three years—2017, 2018, and 2019. The results for the sample of $n = 27$ and $T = 3$ for a total of 81 observations are presented in Table 8 below.

Table 8 Results of panel regressions

Independent Variables↓	Fixed effect model Co-efficient (t-value)	Random Effect model Co-efficient (z-value)
C	.02 (0.94)	-.004 (-0.602)
TLR	0.30 (1689.71)**	.30 (4104.48)**
RPP	.29 (1105.25)**	.30 (3355.00)**
GO	.20 (866.28)**	.20 (3174.61)**
OI	0.09 (561.42)**	0.09 (1374.44)**
PER	0.09 (701.86)**	0.09 (1471.00)**
Hausman Prob > Chi ²	4.96 (0.42)	

Note. Dependent variable = T-Score

C: Constant, TLR: Teaching Learning and Resources, RPP: Research and Professional Practice, GO: Graduation Outcome, OI: Outreach and Inclusivity, PER: Perception, T-Score: Total Score

* $p < .10$, ** $p < .05$, *** $p < .01$

Having run, both fixed and random effects models we have applied the Hausman test to choose an appropriate model. The Hausman test statistic not being significant, we accept the

random effect model as the final model. The results of the random effects panel model indicate that teaching, learning, and resources; research and professional practice; and graduation outcomes determine the total score and ranking since the coefficients of these variables are positive and statistically significant. The coefficients of perception and outreach and inclusivity are lower in magnitude though positive and statistically significant.

The universities and institutions have been engaged in teaching and research for the last few decades before the NIRF ranking. It may be

inferred from the results that teaching, learning, and resources, which comprises metrics on teacher-student ratio, faculty experience, and qualification such as Ph.D., availability of other learning resources like labs and library, etc. is significant. The underlying reason may be the availability of such resources with all institutions in different degrees. The NIRF ranking also compelled all institutions to compile the correct set of data to be declared in public and their portals for public consumption. The results also reveal that the parameters turning significant are the ones having reliable data on part of all institutions. Similarly, institutions and universities have reliable data on parameters related to research and professional practice, i.e., publications, citations, IPR indicators including patents. This is captured by research and professional practice in our regressions and turns out to be significant. It's observed that many institutions have found it difficult to supply data on graduation outcomes. The graduation outcomes draw heavily upon students' performance in university examinations and also public examinations. It's really difficult to keep track of public examinations unless there is robust data collection mechanism is in place in any institution. The coefficient of graduation outcomes in our regressions is, therefore, lower in magnitude than teaching, learning, and resources and research and professional practice. The institutions have some control over outreach and inclusivity but not over perception. Perception comes from peer rating through surveys done by NIRF ranking. Universities and institutions have no control over the generation of this variable. Outreach and inclusivity deals with a variety of parameters like services rendered to society, the composition of students from backward communities, differently-abled backgrounds, etc. These two variables have less impact on ranking. This may be because there are still gaps for the institutions to do a lot better in these two areas.

IV. NIRF ranking: Advantages

The NIRF ranking is the first ever recognized and objective annual ranking of higher education institutions in the country by the MHRD, Government of India. It would motivate the higher education institutions in India to participate and compete with each other irrespective of their heterogeneity—institutions vs. universities, public vs. private, central government vs. state government. The higher education institutions in India would focus more the development of the parameters of NIRF ranking. After fulfilling these parameters, the Indian higher education institutions would be able to participate and figure in the international rankings. The NIRF ranking gives a brand, recognition, and a reason for the attraction of the students to choose the institutions. This would pave a way to launch new courses and programs and to adopt new technology. The faculty and research scholars would be encouraged to increase their research publications and citations in order to achieve high ranking.

V. NIRF ranking: Shortcomings

The NIRF ranking is based on the number of institutions participating in it. If all institutions are mandated to participate it could encourage the competition and be fair in its assessment. The data provided by the institutions to compete in the NIRF ranking need to be verified. The frequent change in rankings among the institutions on yearly basis also suggests that there is a lack of stability. There is no clarity in the criteria of ranking and the parameters being considered. It has not been mentioned as to why these five parameters only have been chosen. The NIRF ranking can be accurate and transparent, if the data used are available on the website for confirmation. There is also a chance that the NIRF ranking may lead to the mad rush for publication of papers and leading to poor quality research outputs and teaching. The academic institutions may force the researchers to cite the

work of their institutions for increasing the Citation Index. The benchmark for measuring the different disciplines needs to be evolved like Sciences, Social Sciences, Humanities, and Performing Arts. The measurement may be biased depending upon the parameters considered and if it suits few institutions like the American and European institutions. The ranking should be done among equals and on similar grounds as many American and European institutions are more than 100 years old and most of the Indian institutions are below 100 years.

VI. Conclusion and recommendations

The study is unique in assessing the NIRF ranking panel data for three years under overall category of higher education institutions in India. The study has identified the major determinants of overall ranking of the higher education institutions. Though quality in teaching and research is highly subjective, dynamic, multilevel, and multi-dimensional and is often debated in academic circles, ensuring quality in higher education is a major challenge in India today. There is an inadequate focus on research in higher education institutions. There are insufficient resources and facilities, as well as, limited numbers of quality faculty to mentor students. Moreover, Indian higher education institutions are poorly connected to research centers and industries. The UGC has directed all higher education institutions to have an internal quality assurance cell (IQAC) for maintaining the quality parameters not only in the recruitment of faculty but also in publication and identification of journals [2]. Moreover, all higher education institutions have not undergone the accreditation, though there is NAAC under the UGC, as accreditation is not made a mandatory requirement.

Nevertheless, the NIRF ranking parameters should be finalized based on the feedback from different institutions and be measurable for transparency. The NIRF ranking

should be on similar lines with the renowned international rankings, so that the Indian higher education institutions prepare and perform better in all ranking systems. The evaluation should not be subjective as in the present context it is observed that '*perception*' as a parameter is not transparent as it may be biased in favor of specific institutions, like IIT's or Indian Institute of Science. This needs to be rationalized further for more credibility.

However, the following recommendations may be considered to make the NIRF ranking more viable and scientific.

(i) The participation of all higher education institutions in India should be made mandatory for a free, fair, and true reflection of national rankings.

(ii) There should be a mechanism in place to measure the authenticity of data provided by the participating institutions.

(iii) There should be a rationalization in ranking of the institutions in terms of the number of students, the number of faculty, and the age of the institutions to bring parity. It may not be fair to compare two institutions with wide disparity in terms of the number of students (1000 vs. 100000), faculty (100 vs. 1000), and the age of institutions (recent vs. more than 100 years).

(iv) There should be strict monitoring on research publications. The NIRF ranking system should come out with a standard list of journals which may be considered for the purpose of ranking of the institutions and the remaining journals may be considered for other purposes, like faculty promotion and requirement of the research scholars.

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