

# Rankings of Indian Universities: A Scientometrics Analysis

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## **Abstract**

*In the present paper an attempt has been made to assess the Academic rankings of Universities in India. The main objectives of the study are to measure the growth of publications of the National Assessment and Accreditation Council ( NAAC) accredited universities; to identify the rank of Indian universities; to measure the collaboration and h-index; to compare the Indian universities through publication output and h-index, and to find out the highly productive Indian universities and to rank them. For the study 50 Indian Universities output of publications have been taken from the SCOPUS international multidisciplinary bibliographical database covering during 2001-2010. Study provides the reader with a comprehensive understanding of a university ranking schemes based on its methodological issues, and impacts on society. The University rankings may be used in policy making and academic discussions.*

**Keywords:** University Ranking, Scientific Collaboration, h- index

## **1. Introduction**

The Universities and Colleges are the largest performing sectors of science and technology (S& T) in the country. Universities are undertaking basic research mainly to support and advance their academic programs at the undergraduate, postgraduate and doctoral levels. Its constituents are funded by the University Grants Commission (UGC), Ministry of Human Resources Development (MHRD), and All India Council of Technical Education (AICTE), depending upon their status as government aided or private institution. S& T have played a very important role in overall development of country. Due to the sustained efforts during the six decades, India can boast of a strong base for more than 504 Universities and 25,951 colleges, including 2,565 women colleges, in India. 136.42 lakh students get enrolled in various Universities and colleges. 56.49 lakh is the

total enrollment of women students in the country and the highest is 8 lakh in Uttar Pradesh. 5.89 lakh is regular faculty strength, 0.90 lakh in Universities and 4.99 lakh in colleges throughout the country. Teaching and research are the primary functions of the Universities. India has witnessed a phenomenal development both in quantitative and qualitative terms, over since independence. Research in a university demands the fertile minds and an environment of intellectual interaction of scientific literature which is expanding very fast. Despite the glorious record achievements and progress made in the recent past, the pace of growth of the scientific enterprises in India has been comparatively slow. Universities and colleges have not been able to retain their good image in science and technology education. UGC has initiated various steps for improving education at all levels. Academic ranking is one of them.

A ranking is a relationship between a set of items such that, for any two items, the first is either 'ranked higher than', 'ranked lower than' or 'ranked equal'.



By reducing detailed measures to a sequence of ordinal numbers, rankings make it possible to evaluate complex information according to certain criteria. Analysis of data obtained by ranking commonly requires non-parametric statistics.

Academic ranking is gaining prominence in higher education due to the interplay of many factors, namely: i) shrinking resources allocation for higher education from public funds, ii) increasing competition among higher education institutions and iii) the growing awareness about the value of money among the public. The stake holders pay attention to institutional quality with one or more interests: a) governments for accountability and policy-making b) funding agencies for funding decisions, c) society for value of tax payers money, d) industry for institutional industry partnership, and e) prospective students for admission and career prospects etc.

## 2. Methodology

For the present study 50 Indian Universities output of publications have been taken from the SCOPUS international multidisciplinary bibliographical database covering more than 16,000 international peer reviewed journal of the world, during 2001-2010. Only those Universities which offer post-graduate course in science, social science and humanities are included in this study. To determine the ranks the total articles, citations, the National Assessment and Accreditation Council grade (NAAC), collaboration pattern of the Universities and H-index have been taken.

## 3. Analysis of the Data

### 3.1. Ranking of Universities through Publication Output

Table 1 shows one way ranking of these 50 universities based on combined publication output. These

50 universities contributed 108666 papers. The average output of these 50 universities is 2173 papers, and 17 universities have published above the average output. Among these 17 universities the largest number of papers 6533 (6.01%) is published by Jadavapur University, followed by Banares Hindu University 6249 (5.75%), University of Hyderabad 6081 (5.6%), Anna University 6006 (5.53%), University of Calcutta 4623 (4.25%), University of Madras 3742 (3.44%), Andhra University 3702 (3.41%), University of Rajasthan 3634 (3.34%), University of Pune 3624 (3.33%), Annamalai University 3519 (3.24%), Gujarat University 3183 (2.93%), University of Kerala 3150 (2.9%), University of Mumbai 2752 (2.53%) and least publications are from Utkal University that is 711 (0.65%). It is surprising to note that, the university has been accredited with 'B++' grade.

The 108666 papers contributed by these 50 universities have received 336027 citations during 2001-10, with the average citation per paper as 3.09, of the 50 universities, 27 universities have scored above the average citation per paper. Among these, 27 universities, Utkal University scored highest average (9.23), followed by Karnatak University (6.45), Mahatma Gandhi University (6.29), University of Jammu (6.23), Alagappa University (5.95), Guru Nanak Dev University (5.83), Bharathiar University (5.69), University of Burdwan (5.21), Madurai kamaraj University (5), Shivaji University (4.98), University of Kalyani (4.94), Pondicherry University (4.92), Jamia Hamdard University (4.8), Sri Venkateswar University (4.67), Jadavapur University (4.62), Bharthidasan University (4.32) Birla Institute of Technology and Science (4.19), North Eastern Hill University (4.14), MS University of Baroda (4.07) and lowest citations are received by the University of Rajasthan, that is, (0.85) and it has been accredited with 'A' grade.

Among these, the largest share of international collaborative publications in total publication output is recorded by Anna University (7.22%), followed by Jadavpur University (5.99%), Panjab University (5.78%), University of Hyderabad (5.70%), Banaras Hindu University (4.80%), University of Calcutta (4.74%), Mangalore University (4.53%), University

of Pune (4.46%), Gulbarga University (3.85%), University of Madras (3.54%), University of Mysore (3.17%), Andhra University (2.54%), University of Kerala (2.29%), Bharatidasan University (2.26%), University of Rajasthan (2.20%), Bharathiar University (2.06%), University of Jammu (1.95%), and the least is scored by University of Allahabad (0.23%).

Rank	Name of the University	Articles	%	Citations	CITP	Grade
1	Jadavpur University	6533	6.01	30161	4.62	A (CGPA)
2	Banaras Hindu University	6249	5.75	14754	2.36	A
3	University of Hyderabad	6081	5.6	23825	3.92	A (CGPA)
4	Anna University	6006	5.53	19183	3.19	Five Star
5	University of Calcutta	4623	4.25	13501	2.92	A (CGPA)
6	University of Madras	3742	3.44	5213	1.39	A
7	Andhra University	3702	3.41	3965	1.07	A (CGPA)
8	Panjab University	3701	3.41	9384	2.54	A (CGPA)
9	University of Rajasthan	3634	3.34	3101	0.85	A+
10	University of Pune	3624	3.33	5783	1.6	A+
11	Annamalai University	3519	3.24	7362	2.09	B++
12	Gujarat University	3183	2.93	5091	1.6	A (CGPA)
13	University of Kerala	3150	2.9	4035	1.28	B++
14	University of Mumbai	2752	2.53	6661	2.42	Five Star
15	University of Mysore	2670	2.46	4033	1.51	A+
16	University of Lucknow	2546	2.34	4514	1.77	Four star
17	Bangalore University	2178	2	5754	2.64	A
18	Osmania University	1977	1.82	5716	2.89	A (CGPA)
19	Mangalore University	1899	1.75	7398	3.9	Four Star
20	Guru Nanak Dev University	1878	1.73	10952	5.83	A (CGPA)
21	University of Allahabad	1828	1.68	2387	1.31	B (CGPA)
22	Birla Institute of Technology	1824	1.68	5854	3.21	B+
23	Assam University	1779	1.64	5039	2.83	B
24	Cochin University of Science and Technology	1564	1.44	5026	3.21	***
25	Bharathidasan University	1481	1.36	6403	4.32	A
26	Bharathiar University	1387	1.28	7888	5.69	A (CGPA)
27	Sri Venkateswara University	1379	1.27	6438	4.67	A (CGPA)
28	Karnatak University	1342	1.23	8650	6.45	A

Rank	Name of the University	Articles	%	Citations	CITP	Grade
29	Shivaji University	1334	1.23	6638	4.98	B
30	University of Kalyani	1328	1.22	6559	4.94	B (CGPA)
31	Madurai Kamaraj University	1324	1.22	6625	5	A
32	University of Jammu	1322	1.22	8241	6.23	A (CGPA)
33	University of Burdwan	1217	1.12	6343	5.21	B++
34	M S University of Baroda	1212	1.12	4936	4.07	B (CGPA)
35	Punjabi University	1165	1.07	3601	3.09	A (CGPA)
36	Kurukshetra University	1137	1.05	3132	2.75	A (CGPA)
37	University of Kashmir	1101	1.01	1411	1.28	A
38	Jamia Hamdard, (Hamdard University)	992	0.91	4759	4.8	A (CGPA)
39	Sardar Patel University	965	0.89	4040	4.19	B (CGPA)
40	Kakatiya University	962	0.89	3381	3.51	A (CGPA)
41	Pondicherry University	956	0.88	4703	4.92	B++
42	Birla Institute of Technology & Science	951	0.88	3986	4.19	A (CGPA)
43	Alagappa University	872	0.8	5190	5.95	A
44	Himachal Pradesh University	871	0.8	2669	3.06	B (CGPA)
45	North Eastern Hill University	868	0.8	3594	4.14	A (CGPA)
46	Gulbarga University	834	0.77	3195	3.83	B (CGPA)
47	V I T University	797	0.73	2807	3.52	A (CGPA)
48	Mahatma Gandhi University	782	0.72	4917	6.29	A (CGPA)
49	Manipal University	734	0.68	669	0.91	B
50	Utkal University	711	0.65	6560	9.23	B++
		108666		336027		

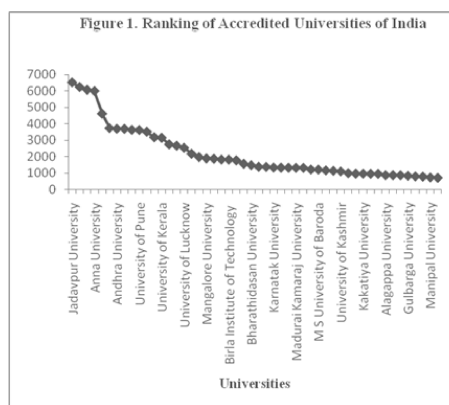


Figure 1: Ranking of accredited Universities of India

### 3.2 Ranking of Universities Based on Collaboration Output

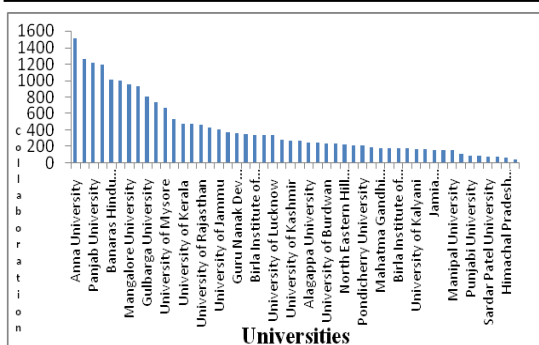
Research collaboration has obtained more attention in the past years, with scholars realizing that either local collaboration or collaboration over large distances via the Internet increases the research output. Collaboration generates more knowledge, which, in turn, leads to new ideas (innovation) and improved academic productivity. It is believed that collaboration leads to a decrease in redundancy of research efforts and increased resource savings, and to a reduction of costs for research. In general, it has been observed that research collaborations have become a major issue in science policy. Collaboration as a policy objective became essential for countries to keep pace with scientific progress.

Among these the largest share of international collaborative publications in total publication output is recorded by Anna University (7.22%), followed by Jadavpur University (5.99%), Panjab University (5.78%), University of Hyderabad (5.70%), Banaras Hindu University (4.80%), University of Calcutta (4.74%), Mangalore University (4.53%), University of Pune (4.46%), Gulbarga University (3.85%), University of Madras (3.54%), University of Mysore (3.17%), Andhra University (2.54%), University of Kerala (2.29%), Bharatidasan University (2.26%), University of Rajasthan (2.20%), Bharathiar University (2.06%), University of Jammu (1.95%) and least scored is by the University of Allahabad (0.23%).

**Table 2: Ranking of Universities based on Collaboration**

Rank	Name of the University	Articles	Citations	TICP	H-index	Grade
1	Anna University	6006	19183	1514	20	Five Star
2	Jadavpur University	6533	30161	1256	41	A (CGPA)
3	Panjab University	3701	9384	1212	32	A (CGPA)
4	University of Hyderabad	6081	23825	1196	19	A (CGPA)
5	Banaras Hindu University	6249	14754	1007	27	A
6	University of Calcutta	4623	13501	994	27	A (CGPA)
7	Mangalore University	1899	7398	950	35	Four Star
8	University of Pune	3624	5783	935	37	A+
9	Gulbarga University	834	3195	808	25	B (CGPA)
10	University of Madras	3742	5213	742	28	A
11	University of Mysore	2670	4033	664	25	A+
12	Andhra University	3702	3965	532	19	A (CGPA)
13	University of Kerala	3150	4035	481	29	B++
14	Bharathidasan University	1481	6403	473	37	A
15	University of Rajasthan	3634	3101	462	28	A+
16	Bharathiar University	1387	7888	433	39	A (CGPA)
17	University of Jammu	1322	8241	409	45	A (CGPA)
18	Annamalai University	3519	7362	379	33	B++
19	Guru Nanak Dev University	1878	10952	359	41	A (CGPA)

Rank	Name of the University	Articles	Citations	TICP	H-index	Grade
20	Sri Venkateswara University	1379	6438	355	32	A (CGPA)
21	Birla Institute of Technology	1824	5854	337	36	B+
22	Bangalore University	2178	5754	336	32	A
23	University of Lucknow	2546	4514	335	28	Four star
24	Madurai Kamaraj University	1324	6625	279	33	A
25	University of Kashmir	1101	1411	272	17	A
26	University of Mumbai	2752	6661	271	32	Five Star
27	Alagappa University	872	5190	252	32	A
28	V I T University	797	2807	250	31	A (CGPA)
29	University of Burdwan	1217	6343	238	37	B++
30	Cochin University of Science and Technology	1564	5026	236	29	***
31	North Eastern Hill University	868	3594	224	27	A (CGPA)
32	Gujarat University	3183	5091	221	24	A (CGPA)
33	Pondicherry University	956	4703	220	32	B++
34	Karnatak University	1342	8650	194	40	A
35	Mahatma Gandhi University	782	4917	187	34	A (CGPA)
36	Shivaji University	1334	6638	185	35	B
37	Birla Institute of Technology & Science	951	3986	185	34	A (CGPA)
38	Osmania University	1977	5716	185	32	A (CGPA)
39	University of Kalyani	1328	6559	173	32	B (CGPA)
40	Assam University	1779	5039	166	32	B
41	Jamia Hamdard, (Hamdard University)	992	4759	161	36	A (CGPA)
42	Utkal University	711	6560	160	39	B++
43	Manipal University	734	669	156	15	B
44	M S University of Baroda	1212	4936	116	29	B (CGPA)
45	Punjabi University	1165	3601	94	29	A (CGPA)
46	Kakatiya University	962	3381	90	28	A (CGPA)
47	Sardar Patel University	965	4040	85	30	B (CGPA)
48	Kurukshetra University	1137	3132	84	21	A (CGPA)
49	Himachal Pradesh University	871	2669	69	23	B (CGPA)
50	University of Allahabad	1828	2387	49	26	B (CGPA)
		108666	336027	20971		



**Figure 2: Ranking of top ten universities based on collaboration**

### 3.3. Ranking of universities based on H-index

Jorge E. Hirsch Professor of Physics at the University of California, San Diego, published an article describing the h-index, which he called “a useful index to characterize the scientific output of the researcher”. Hirsch (2005) proposes a scalar index, an original simple new indicator to characterize the cumulative impact of the research work of individual scientists. It is the highest number of publications of the scientists that received ‘h’ or more citations. According to Hirsch, “A scientist has index ‘h’, if ‘h’ of his/her  $N_p$  papers have at least h citations each and

the other ( $N_p-h$ ) papers have no more than h citations each”. (Sangam and Mogali, 2009).

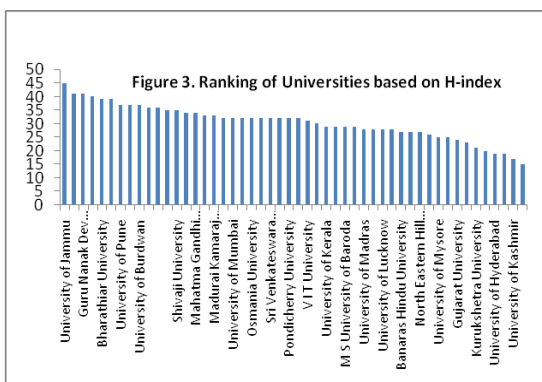
Table 3 and figure 2 show the ranking of top ten universities with H-index. The average H-index recorded by 50 universities is 30.48. Among these universities the largest h-index is scored by University of Jammu (45), followed by Jadavapur University (41), Guru Nanak Dev University (41), Karnatak University (40), Bharathiar University (39), Utkal University (39), University of Pune (39), Bharathidasan University (37), University of Burdwan (37), Birla Institute of Technology (36), Jamia Hamdard (36), Mangalore University (35), Shivaji University (35), Birla Institute of Technology and Science (34), Mahatma Gandhi University (34), Annamalai University (33), Madurai Kamaraj University (33), Panjab University (32), Bangalore University (32), VIT University (31), Sardar Patel University (30), University of Kerala (29), University of Madras (28), Banaras Hindu University (27), University of Allahabad (26), University of Mysore (25), and Gulbarga University (25). The least h-index is recorded by Manipal University (15) and it has been accredited with ‘B’ grade.

**Table 3: Ranking of Universities based on H-index**

Rank	Name of the University	Articles	Citations	TICP	H-index	Grade
1	University of Jammu	1322	8241	409	45	A (CGPA)
2	Jadavpur University	6533	30161	1256	41	A (CGPA)
3	Guru Nanak Dev University	1878	10952	359	41	A (CGPA)
4	Karnatak University	1342	8650	194	40	A
5	Bharathiar University	1387	7888	433	39	A (CGPA)
6	Utkal University	711	6560	160	39	B++
7	University of Pune	3624	5783	935	37	A+
8	Bharathidasan University	1481	6403	473	37	A
9	University of Burdwan	1217	6343	238	37	B++
10	Birla Institute of Technology	1824	5854	337	36	B+
11	Jamia Hamdard, (Hamdard University)	992	4759	161	36	A (CGPA)

Rank	Name of the University	Articles	Citations	TICP	H-index	Grade
12	Mangalore University	1899	7398	950	35	Four Star
13	Shivaji University	1334	6638	185	35	B
14	Birla Institute of Technology & Science	951	3986	185	34	A (CGPA)
15	Mahatma Gandhi University	782	4917	187	34	A (CGPA)
16	Annamalai University	3519	7362	379	33	B++
17	Madurai Kamaraj University	1324	6625	279	33	A
18	Panjab University	3701	9384	1212	32	A (CGPA)
19	University of Mumbai	2752	6661	271	32	Five Star
20	Bangalore University	2178	5754	336	32	A
21	Osmania University	1977	5716	185	32	A (CGPA)
22	Assam University	1779	5039	166	32	B
23	Sri Venkateswara University	1379	6438	355	32	A (CGPA)
24	University of Kalyani	1328	6559	173	32	B (CGPA)
25	Pondicherry University	956	4703	220	32	B++
26	Alagappa University	872	5190	252	32	A
27	V I T University	797	2807	250	31	A (CGPA)
28	Sardar Patel University	965	4040	85	30	B (CGPA)
29	University of Kerala	3150	4035	481	29	B++
30	Cochin University of Science and Technology	1564	5026	236	29	***
31	M S University of Baroda	1212	4936	116	29	B (CGPA)
32	Punjabi University	1165	3601	94	29	A (CGPA)
33	University of Madras	3742	5213	742	28	A
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38	University of Calcutta	4623	13501	994	27	A (CGPA)
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40	University of Allahabad	1828	2387	49	26	B (CGPA)
41	University of Mysore	2670	4033	664	25	A+
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48	Andhra University	3702	3965	532	19	A (CGPA)
49	University of Kashmir	1101	1411	272	17	A
50	Manipal University	734	669	156	15	B
		108666	336027	20971		





**Figure 3: Ranking of top ten universities based on H-index**

The Indian universities published 108666 papers during 2001-2010. The average output of these 50 universities is 2173 papers, in comparison the largest number of papers 6533 (6.01%) was published by Jadavapur University, followed by Banaras Hindu University 6249 (5.75%), University of Hyderabad 6081 (5.6%), University of Calcutta 4623 (4.25%), and these universities got 'A' grade by NAAC. Anna University 6006 (5.53%), but 'Five Star' grade has been given by the NAAC. University of Madras 6683 (3.82%), and least publications are from the University of Jammu that is 1321 (0.75%). It is surprising to note that, the university has been accredited with 'A' grade.

The 108666 papers contributed by these 50 universities have received 336027 citations during 2001-10, with the average citation per paper as 3.09. Of the 50 universities, Utkal University scored highest average (9.23), followed by Karnatak University (6.45), Mahatma Gandhi University (6.29), University of Jammu (6.23), Alagappa University (5.95), Guru Nanak Dev University (5.83), Bharathiar University (5.69), University of Burdwan (5.21), Madurai Kamaraj University (5), Shivaji University (4.98), University of Kalyani (4.94), Pondicherry University (4.92), Jamia Hamdard University (4.8), Sri

Venkateswar University (4.67), Jadavapur and the lowest citations were received by University of Rajasthan, that is, (0.85) and it has been accredited with 'A' grade.

As we discussed in the table the accreditation of universities, in which, the University of Rajasthan, the University of Pune and the University of Mysore have got 'A+' grade, and according to publication output these universities are placed in 9th (University of Rajasthan, 3634 papers) and 10th (University of Pune, 3624 paper) and 15th (University of Mysore, 2670 papers) rank respectively, and the University of Mysore has not occupied the place in ranking of top 10 universities in India on the basis of publication output. According to collaboration, Anna University stands in the top place, and it is surprising to note that, it has been accredited with 'Five Star' grade by NAAC. The Mangalore University has got 'Four Star' grade and it is ranked seven according to collaboration-wise, and Gulbarga University has got 'B' grade and it is ranked ninth and the University of Mysore has got 'A+' grade and it is placed eleventh rank.

The indices of scientific productivity (the quantity of articles published by the teaching staff of a university and frequency of their citation) are an important constituent of an average weighted estimate in all these ratings. These indices have become a rather convenient indicator for comparative analysis and an impetus for universities to achieve higher positions with a lesser in expenditures.

#### 4. Conclusion

Ranking is a tool for measuring the effectiveness of higher education institutions. It is often assumed that highly ranked institutions are more productive, have higher quality teaching and research, and contribute more to society than lower-ranked institutions. Universities typically measure faculty research productivity by their publication counts, citation counts.

This study provides the reader with a comprehensive understanding of a university ranking schemes based on its methodological issues, and impacts on society. The rankings are used in policy and academic discussions. Recently, policymakers and the media often criticize their universities based on their ranking status. Further, many of institutional leaders set ranking as their benchmark in their vision or master plan for the university. Nevertheless, academics are quite doubtful about rankings because they believe that they mislead higher education institutions as well as have enormous methodological limitations.

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