

Relevance of Bibliometric Study in Ranking/Performance of the Institutes: A Case Study

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Abstract

Present case study attempts to find the relevance of bibliometrics in withdrawing the ranking/reputation of the Institutes. We attempt to compare the ranking assigned by the various international and national bodies and the ranking withdrawn on the basis of bibliometrics and its various components like h-index, total citations, publications per faculty etc. from Scopus database. Study attempt to draw the conclusion whether the bibliometrics could be relevant/appropriate or not in withdrawing the ranking/reputation of the institutes. Various data of Indian Institutes of Technology (IIT) and National Institute of Technology (NIT) has been collected for the above study as these institutes are of Indian National Importance and globally recognized and the ranking given by various internationally/Nationally acclaimed institutes.

Keywords: *Bibliometrics, Citation Analysis, Scopus, h-index, Ranking, Research Evaluation*

1. Introduction

The current study was initiated as per the advice of the Director, NIT Rourkela at the time of need to evaluate our performance and also the performance of other similar institutes of national importance. So that proper monitoring and further improvements can be done at Institute level, apart from this the study also helped in decision making and presenting the growth profile of NIT Rourkela at each year. The study was carried out by selecting the sample of all IITs and twenty old NITs as these institutes are of most important and contributing much in research and development activities. The need was felt to withdraw the various statistics on the basis of citation analysis like h-index, publications per faculty, citations per faculty, citations per article etc. in such a way that a comparison statement can be put among the all major IITs and NITs.

1.1 About Indian Institute of Technology

The Indian Institutes of Technology (IITs) is a prestigious autonomous government engineering institutes of India. The IITs are governed by the Institutes of Technology Act, 1961 which has declared them as "institutions of national importance", and lays down their powers, duties, framework for governance etc. The Institutes of Technology Act, 1961 lists sixteen institutes located at Varanasi, Roorkee, Ropar, Patna, Mumbai, Mandi, Kharagpur, Kanpur, Bhubaneswar, Chennai, Delhi, Gandhinagar, Guwahati, Hyderabad, Indore, and Jodhpur. Each IIT linked to the others through a common IIT Council, which oversees their administration. The IITs award degrees ranging from B.Tech to PhD.

1.2 About National Institute of Technology

The National Institutes of Technology (NITs) are a government engineering colleges of India. Earlier all NITs were referred to as Regional Engineering Colleges (RECs) and were governed by their respective



state governments. NITs were founded to promote regional diversity and multi-cultural understanding in India. There are thirty autonomous institutes located in one each major state/territory of India. In 2007, the Indian government declared these colleges as Institute of National Importance. NITs offer degree courses at bachelors, masters, and doctorate levels in various branches of engineering and technology.

2. Bibliometrics

The term bibliometrics was first coined by Alan Pritchard in a paper published in 1969, titled Statistical Bibliography or Bibliometrics. He defined the term as "the application of mathematics and statistical methods to books and other media of communication". Bibliometrics is statistical analysis of written publications, such as books or articles in journals etc. Bibliometric methods are mainly used in the field of library and information science, including scientometrics. For instance, bibliometrics are used to provide quantitative analysis of academic literature. Citation analysis and content analysis are commonly used bibliometric methods. Researchers may use bibliometrics methods of evaluation to determine the influence of a single writer, for example to describe the relationship between two or more writers or works. Bibliometric methods may be used to evaluate the performance and reputation of a particular author or the Institutes as well.

3. Scopus Database

Scopus is one of the largest abstract and citation database of peer-reviewed scientific journals, books and conference proceedings. It delivers a comprehensive overview of the world's research output in the fields of medicine, science, technology, social sciences, arts and humanities, Scopus features smart tools to track, analyze and visualize research.

3.1 Scopus includes the following:

21,000 titles from more than 5,000 international publishers, 20,000 peer-reviewed journals (including 2,600 open access journals), 390 trade publications, 370 book series, 5.5 million conference papers, Articles-in-Press" from more than 3,850 journals and publishers such as Cambridge University Press, Elsevier, Springer, Wiley-Blackwell, Nature Publishing Group and the Institute of Electrical and Electronics Engineers

3.2 Scopus' 50 million records consist of the following:

29 million records, including references, going back to 1995 (84% include abstracts) 21 million pre-1996 records going back as far as 1823, Scopus also cross-searches 25.2 million patents from five patent offices (US Patent & Trademark Office, European Patent Office, Japan Patent Office, World Intellectual Property Organization and the UK Intellectual Property Office)

4. Data Collection and Methodology

The sampling method was adopted to get the data from scopus database and by restricting the year from 2012 to 2014. Scopus database was selected as it provided well searching facility by affiliation search as well as unique ID assigned to each Institutes/Universities by this database which is unique feature and there is less chance of noise and missing records in search results. The advance search option provided in the database was used, for example to search the document of National Institute of Technology Rourkela (NITR) having affiliation ID 60000934 and restriction of year from 2012 to 2014 the following search strategy was adopted in advance search module:

AF-ID(60000934) AND PUBYEAR AFT 2011

Code: AF-ID = Affiliation ID for NIT Rourkela , AND is Boolean operator and PUBYEAR AFT = publication of document after any year like 2011 as above.

4.1 Data Evaluation and Statistics

The various data collected by above method is tabulated below, Data is accesses with the Unique Affiliation/Institute ID assigned by Scopus database to each Institutes as described above and Search Limited from year 2012 to 2014, the whole data was accessed on 22/10/2014.

Table: 1

Sr. No.	Name of Institute	Approx No. of Faculty	Total Documents Published	Documents Per Faculty	Total Citations Received	Citations Per Document	H-Index
8	IIT Bombay	617	3953	6.41	7922	2.00	27
2	IIT Kharagpur	564	4669	8.28	8759	1.88	24
6	IIT Guwahati	334	2243	6.72	4790	2.14	24
5	IIT Madras	538	3767	7.00	6159	1.63	23
3	IIT Roorkee	393	3173	8.07	5576	1.76	22
1	IIT Delhi	421	4337	10.30	7051	1.63	21
4	IIT Kanpur	378	2989	7.91	6013	2.01	21
11	IIT Indore	77	445	5.78	1469	3.30	20
9	NIT Tiruchirappalli	246	1473	5.99	2325	1.58	16
7	IIT Ropar	52	337	6.48	966	2.87	15
28	IIT (BHU) Varanasi	233	556	2.39	1388	2.50	15
10	NIT Rourkela	229	1337	5.84	2040	1.53	14
15	NIT Durgapur	177	862	4.87	1399	1.62	14
16	NIT Surat	183	758	4.14	1186	1.56	14
12	IIT Hyderabad	102	553	5.42	828	1.50	12
14	IIT Bhuwaneswar	73	372	5.10	684	1.84	11
17	NIT Allahabad	199	816	4.10	845	1.04	11
30	NIT Bhopal	200	307	1.54	581	1.89	11
21	NIT Calicut	179	560	3.13	614	1.10	10
27	NIT Hamirpur	152	384	2.53	536	1.40	10
13	IIT Patna	71	379	5.34	466	1.23	9
20	NIT Karnataka	270	855	3.17	666	0.78	9
25	NIT Jaipur	184	481	2.61	399	0.83	9
18	NIT Jalandhar	120	451	3.76	528	1.17	8
22	NIT Warangal	200	587	2.94	465	0.79	8
23	NIT Kurukshetra	190	549	2.89	429	0.78	8
29	NIT Nagpur	185	306	1.65	334	1.09	8
19	IIT Mandi	49	177	3.61	238	1.34	7
24	IIT Gandhinagar	76	205	2.70	281	1.37	7
34	NIT Jamshedpur	134	114	0.85	127	1.11	6
26	IIT Jodhpur	48	124	2.58	127	1.02	5
31	NIT Silchar	143	213	1.49	155	0.73	5
32	NIT Agartala	219	250	1.14	167	0.67	5
33	NIT Raipur	138	152	1.10	100	0.66	5
35	NIT Patna	105	40	0.38	37	0.93	3
36	NIT Srinagar	155	15	0.10	11	0.73	2

4.2 Graphical representation of Data

The various types of graphical representation of data below indicate the ranking of various institutes during October 2014. The sky blue indicates the IITs, green is the indicator of NITs and red is the indicator of NIT Rourkela. The bar chart is prepared with data of h-index, publication per faculty and total citations per faculty which is mainly considered by ranking institutions.

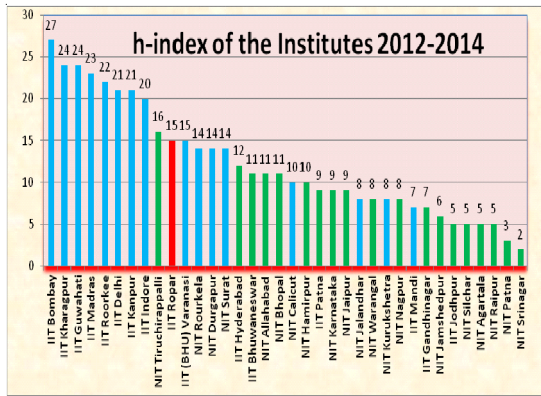


Figure: 1

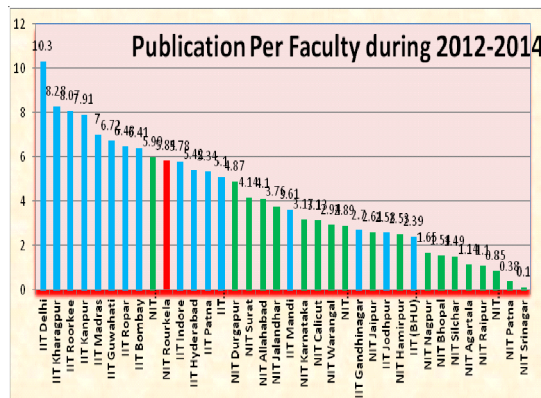


Figure: 2

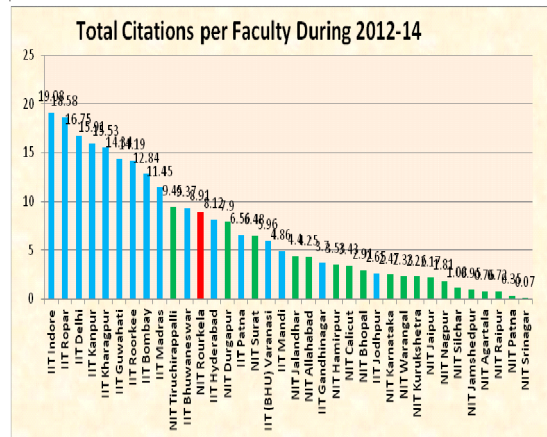


Figure: 3

5. Ranking of the Indian Institutes

For the purpose of evaluations of above bibliometrics study and data various ranking institutes website was visited and top three Indian universities/Institutes is tabulated below. The data very clearly indicates the presence of institutes which is sampled under present case study and its ranking among top Institutions of India, which gives strong base to the current case study.

Table: 2

Ranking Institute	Region	Year	First	Second	Third
QS University Ranking	India	2014-15	Indian Institute of Technology Delhi (IITD)	Indian Institute of Technology Bombay (IITB)	Indian Institute of Technology Kanpur (IITK)
The world University Ranking	India	2014-15	Indian Institute of Science	Panjab University	Indian Institute of Technology, Bombay
Center for world University rankings	India	2014	Indian Institute of Technology Delhi	University of Delhi	Indian Institute of Science
4th International colleges and Universities	India	2014	Indian Institute of Technology Bombay	Indian Institute of Technology Madras	Indian Institute of Technology Kanpur
Careers360: The Education Hub	India	2014	Indian Institute of science	Indian Institute of Technology Bombay	Indian Institute of Technology Kharagpur

6. Conclusion

The above case study revealed that bibliometrics study is a useful and powerful tool/methodology for finding the ranking and relevance/reputation of the institutes in terms of their academic and research output. The comparison of various ranking by word/Indian renounced institutes/websites also indicates that the institutes which has been given top ranks under the current study (h-index, citation/faculty etc.) is also appearing within the first three ranks observed by the ranking assigning institutes. However the bibliometrics study does not accurately states the rank as other institutes but it also various similar to ranking assigned by other ranking institutes. Therefore bibliometric study could be also a useful tool to assign the ranking and reputation of the Institutes at global level similar to identifying the ranking/reputation of the individual author contribution in research and development.

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