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Explored publication pattern of the top twenty NIRF-2020 ranked Indian institutions: An evaluative study

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Abstract:

Institutions ranking are getting more attention nowadays, as it shows institutions' status globally and influences students' decisions in selecting Institutions for admissions. Open access publications in scholarly research communication are important, but its significance in institutions' ranking is yet to explore. In this study, the authors tried to demonstrate and compare open access and commercial publication documents of the top twenty institutions (overall category) as per the National Institutional Ranking Framework (NIRF) 2020 report**.** According to NIRF-2020, maintaining their last year's positions, IIT Madras and IISc Bangalore bagged the first two ranks, followed by IIT Delhi on the third position among educational institutions with the score of 85.31, 84.18, and 81.33, respectively.In the study, it came out that in comparison to commercial publications open access publication perform better on the parameters of international collaboration, industry collaboration, the article in Q1 journals, citation impact, category normalized Citation Impact and Percentage of the document cited. Having the opinion that ranking provides an effective way of inspiring universities to continue, and hopefully increase, their commitment to open scholarship, this paper propose a parameter for open access publication to evaluate the ranking.This study may help ranking agencies evaluate approaches or a new policy for parameters weighted and researchers interested in research in this field.

Keywords: NIRF; NIRF-2020; Institution ranking; publication pattern; Indian institutions; Open access; commercial publication; CNCI; Timed cited; Incites.

Introduction:

Ranking systems are an aid through which the universities can anticipate their position and work towards improving it. (Alma, Coşkun, and Övendireli, 2016)[1]. During the last two decades, with the emergence of many ranking agencies and influence of institutional ranking in decision making to opting the Institutions for admission have posed challenges to agencies in selecting the ranking parameters. The various stakeholders are adopting university ranking as a reference point in decision-making, such as choosing an Institution by students, searching for a post by academic staff, and allocating subsidies and funds by governments[2].

In recent years many university ranking systems worldwide have been developed, and each framework differs from each other in number, type of parameters and weightage assigned to them. Some ranking agencies give more weightage to academic output than some also give weightage to social parameters, financial aspects and innovations. In India, educational institutions are assessed by the National Assessment and Accreditation Council (NAAC) (http://www.naac.gov.in/), the National Board of Accreditation (NBA)

(https://www.nbaind.org/) and the National Institutional Ranking Framework (NIRF)[3] (https://www.nirfindia.org/2020/Ranking2020.html). The National Institutional Ranking Framework (NIRF) is a methodology adopted by the Ministry of Human Resource Development (MHRD), Government of India, to rank higher education institutions in India. It mainly covers Teaching, Learning and Resources, Research and Professional Practices, Graduation Outcomes, Outreach and Inclusivity, and Perception. (https://www.nirfindia.org/About)[2].

Although open access movement is flourishing worldwide, their influence in the overall academic community and institutions' ranking is still relatively less as their development is subject to many restraints. Firstly, the number of digital, social, open scholarship participants accounts for only a small proportion of the entire academic community. Secondly, identifying the academic community as a whole with digital, social and open scholarship is relatively limited (Ayers 2013 & Esposito 2013)[4,5]. As the open-access publications already come under the publications category, the ranking agencies do not give special weightage to it. In NIRF 2020, there is no weight for open access publishing. Including open access publications parameter in the ranking could be a significant incentive for universities to change current policies and future open scholarship outputs.

Having the opinion that ranking provides an effective way of inspiring universities to continue, and hopefully increase, their commitment to open scholarship, this paper propose a parameter for open access publication to evaluate the ranking. The article also analyses India's top twenty institutions' publication patterns, productivity, and collaborations details by data retrieved from "InCites database" of Clarivate Analytics (formerly Thomson Reuters)[6]. We have tried to establish the relationship between the top twenty institutions according to open-access publication and top 20 institutions of NIRF 2020. The result suggests that agencies should give separately weighted to open access research productivity, document Impacts, and collaboration in ranking evaluation criteria. This study proposes ranking agencies (NIRF) to add and give some weightage to open access under publication parameter, intending to actively encourage and promote institutions to increase their contribution to open access knowledge.

In this study, we have considered a combined metric for publications and the quality of publications. We also included the publication of the top twenty institutions in Q1 journals, Industry, and International collaborations of co-authors. Primary data retrieved from InCites, produced by Clarivate Analytics (Thomson Reuters)[6]. Used bibliographic record, citation data generated from Web of Science core collection, and Journal Citation Reports that enable analyses of institutional academic productivity and benchmark against peers worldwide. Currently, source publications from 1980 onwards are used within InCites, and all document types are included.

Objectives & purpose:

The study has been carried out with the following objectives :

- To identify the pattern share of open access publications over the commercial publications in the top 20 NIRF-2020 institutions.
- To examine the timed cited and Percentage of documents cited in the top twenty NIRF-2020 institutions in both groups (Commercial and open access publications).
- To determine the impact like CNCI and Citation Impact in both groups of the top twenty NIRF-2020 institutions.
- To examine the documents published in Q1 journals by the top twenty NIRF-2020 institutions in both groups and know the impact of Q1 journals on ranking.
- To explore the Percentage of Industry and International collaboration by the top twenty NIRF-2020 institutions in both groups
- To compare the institution ranking of NIRF with the ranking created based on open access publications only.

Scope of the Study and limitations

The study is confined to the top twenty Institutions as per the 2020 NIRF ranking in the overall category only to analyze their publication data. The core collection of Web of Science and Science Citation Index Expanded (SCIE) journals has been considered as listed on InCites for 2017,2018 and 2019. There are two significant limitations in this study that could be addressed in future research. First, the study focused on the first twenty institutions publications only and the second data analyzed based on InCites only. However, Web of Science and Scopus databases used to examine the publications in INRF 2020.

Methodology

In this study, we retrieved primary data from two sources; the first one was the National Institutional Ranking Framework (NIRF) report 2020 (https://www.nirfindia.org/2020/Ranking2020.html) and the second one was InCites database (https://incites.clarivate.com/#/analytics-landing)[5]. The data had been retrieved during August 2020, and we considered the overall group. The top twenty institutions have been selected for the analysis of publications. The database "InCite" used as an analytical tool to retrieve primary data like a number of documents published in open access and commercial journals, timed cited, % of documents cited, CNCI, Citation Impact, and Percentage of documents published in Q1 journals, Percentage of documents in Industry and International collaboration.

Filter Summary used in InCites, for Dataset is "InCites Dataset + ESCI", for Schema is "Web of Science", Time Period is "2017 to 2019", Organization Names are "Indian Institute of Technology (IIT) - Madras, Indian Institute of Science (IISC) - Bangalore, Indian Institute of Technology (IIT) - Delhi, Indian Institute of

Technology (IIT) - Bombay, Indian Institute of Technology (IIT) - Kharagpur, Indian Institute of Technology (IIT) - Kanpur, Jawaharlal Nehru University, New Delhi, Indian Institute of Technology (IIT) - Roorkee, Banaras Hindu University, University of Calcutta, Jadavpur University, Amrita Vishwa Vidyapeetham University, Manipal Academy of Higher Education (MAHE), University of Hyderabad, Jamia Millia Islamia, Indian Institute of Technology (IIT) - Hyderabad, University of Delhi, Savitribai Phule Pune University, Anna University Chennai, Indian Institute of Technology (IIT) – Guwahati", for Open Access is "All Open Access" and for commercial publication documents "Not in Open Access". Data exported on 2020-08-02 and InCites Dataset updated July 29, 2020. The spreadsheet and Microsoft word software were used for data analysis, draw graphs, and tables. We retrieved publication data from the SCOPUS to compare the institutions ranking created based on open access publications with the NIRF rankings. We considered only those institutions in order who are covered in NIRF ranking.

Literature review

Much has been analyzed regarding the ranking process, criteria, parameter, and evaluation mechanism to categories ranking of Institutions by the earlier researchers. Surprisingly, little attention has been allocated to the role of open scholarship in the Institutional ranking. Until now, university ranking agencies have mostly focused their efforts on reporting regular performance indicators (publications, citations, awards, reputation surveys, etc.), leaving out this important new dimension of scholarly communication. So there is enormous gape to research on academic ranking. Majority of the international and national ranking agencies (NIRF) are research-focused. They use a wide range of bibliometric indicators to measure institutions' research performance (Rauhvargers, 2014, p.40 ; Shehatta and Mahmood, 2016, p.1232)[7,8]. However, on time to time, voices emerge to include other parameters also, and scholars suggested many parameters to consider in the ranking of Institutions.

The Leiden Ranking is the first university ranking to include the uptake of OA publishing comprehensively by universities worldwide. The methodological approach that the Leiden Ranking 2019 focuses on assigning OA labels to publications in the WoS database, using Unpaywall to establish the OA status of publications (https://www.cwts.nl/blog?article=n-r2w2a4)[9]. Yu, Wu, ALhalabi, Kao & Wu (2016)[9] focused on ResearchGate metrics and compared with Research Excellence Framework (REF) and Quacquarelli Symonds (QS). With the help of SciVal, they examine correlation analysis to ResearchGate metrics (effectiveness on the researcher level). They suggested that measuring individual researcher performance ResearchGate score can be a useful indicator.

The NIRF is the agency in India who publish a ranking of Indian Institutions every year. However, voices raised many times by the Institutions and academician to include more parameters to NIRF. Mukherjee (2017)[11]

observed that NIRF ranking in India gives more weightage to research and professional practice. Sivakumaren, S. (2017)[12], discussed the NIRF parameters and recommended incorporating other parameters such as h-index of Universities, departments and the faculty members to evaluate the institutions. Balasubramani, J. and Thangavel, R (2019)[13] compared publication on open access platform and commercial platform. They found that open-access database publications are more than commercial databases. The authors recommended that open access could be the best way for institutions publication to reach the masses. The study also suggests to include h-index of individual, department and institutions in evaluation criteria of the NIRF.

Aithal, P.S., Shailashree, V.T., & Suresh Kumar, P.M (2016)[14] suggest in the Indian context, Institutions of higher education require an infusion of quality and clarity on the approach of building world-class educational institutions. The ABCD technique analyzed the NIRF system for higher educational institutions as a novel performance evaluation system. Based on four constructs Advantages, Benefits, Constraints and Disadvantages, this system considers all determinant issues in crucial areas through analyzing the major issues and identifying the critical constituent elements.

Data Analysis:

Open Access and Commercial publications:

Indian Institute of Science, Bangalore was on the 1st position according to NIRF -2017 and NIRF-2018 in the overall category. But in NIRF-2019 and NIRF-2020 Indian Institute of Technology Madras, overcome the Indian Institute of Science, Bangalore, and reach the 1st position in the overall category. Indian Institute of Technology Madras was the 2nd position in the NIRF -2017 and NIRF- 2018 in the overall category.

Table 1 & Table 2 shows the details of open access and commercial documents publication of top twenty Indian institutions in the overall group as per NIRF-2020 report. Table sequence (NIRF rank) has been arranged according to NIRF ranked; Institutions Name and score has been taken from NIRF report 2020. Remaining all parameters like WoS documents, Times cited, % of documents cited, CNCI, etc. has been extracted from the InCite database. Table 1 shows that only four institutions have scored more than 80 in NIRF-2020, namely IIT-Madras followed by IISc, IIT Delhi, and IIT-Bombay in 2020 ranking. In contrast, the mean score of the top twenty institutions is 67.41.

Table 1 & 2 shows, according to Web of Science (WoS) documents, IISc is on the highest position with 2377 documents in open access category, and IIT-Kharagpur is on the highest position in commercial publication documents. As per the citation received or times cited by documents, University of Delhi (UoD) is highest with 19710 documents in open access category and IIT-Kharagpur is highest with 28787 documents in the commercial publication category. In Percentage of documents cited, IIT-Hyderabad is in the highest position

with 82.40% document cited in the open access category. IIT-Roorkee is in the highest position with 70.73% documents cited in a commercial publication. It revealed that open access publication category documents received a maximum number of document citations.

In Category Normalized Citation Impact (CNCI), IIT-Hyderabad has maximum impact value with 3.60 in open access category and Jamia Millia Islamia (JMI) gain the highest impact value with 0.99 in a commercial publication. However, it observed that open access categories' documents got more CNCI value than commercial documents. According to the citation impact, IIT-Hyderabad has most citation impact with 23.73 in open access category and Jamia Millia Islamia (JMI) has most citation impact with 5.09 in the commercial category. IIT-Hyderabad has published maximum documents (68.29%) in Q1 journals in open access category, and IISc has published maximum documents (47.13%) in Q1 journals in commercial publications. It's found that open access publication documents have published maximum documents in Q1 journals. IIT-Kanpur is on the highest position in Industry collaboration with 1.94% documents in the OA category. IISc is on the highest position in Industry collaboration with 2.18% documents in the commercial category. In International Collaborations, IIT-Madras is on the highest position with 65.78% documents in OA category, and IIT-Bombay is on the highest position with 26.97% documents in the Commercial category. It is visible that open access publication documents have more impact in terms of documents citations or Percentage of documents cited and in collaboration with industries or internationally from commercial documents publication.

Open Access publications

NIRF Rank 2020	Name	NIRF Score	WoS Docs	Times Cited	% Docs Cited	CNCI	Citation Impact	% Docs in Q1 Journals	% Industry Collaborations	% International Collaborations
1	IIT-Madras	85.31	1464	19370	73.70	2.18	13.23	65.85	0.96	65.78
2	IISc	84.18	2377	14549	75.01	1.29	6.12	60.10	1.60	50.90
3	IIT-Delhi	81.33	920	4145	69.35	1.05	4.51	41.60	1.63	38.04
4	IIT-Bombay	80.75	1297	14521	71.40	1.89	11.20	46.85	1.16	50.66
5	IIT-Kharagpur	75.85	940	5306	68.30	1.14	5.64	40.54	0.64	42.02
6	IIT-Kanpur	74.99	671	4060	67.96	1.35	6.05	49.81	1.94	46.35
7	IIT-Guwahati	68.81	682	4894	75.95	1.35	7.18	58.05	1.03	41.64
8	JNU	68.76	791	5702	67.89	1.67	7.21	49.75	0.76	34.26
9	IIT-Roorkee	68.48	653	2357	66.62	1.02	3.61	32.11	0.31	30.78
10	BHU	62.03	1284	9277	63.01	1.79	7.23	32.01	1.01	33.10
11	CU	61.01	568	2379	63.38	0.79	4.19	37.59	0.53	30.81
12	JU	60.77	585	2325	69.57	0.79	3.97	31.95	0.17	31.79
13	AVV	60.74	815	4514	49.69	1.46	5.54	47.25	0.74	23.93

14	MAHE	59.96	2116	7661	51.75	0.89	3.62	39.74	0.76	27.17
15	UoH	59.92	581	2647	67.81	0.78	4.56	53.72	0.52	40.45
16	JMI	59.85	514	2925	72.57	1.16	5.69	35.16	0.00	45.14
17	IIT-Hyderabad	59.59	495	11745	82.42	3.60	23.73	68.29	0.61	62.42
18	UoD	58.97	1685	19710	73.29	1.98	11.70	53.42	0.95	49.67
19	SPPU	58.77	559	5304	71.20	1.88	9.49	41.78	0.72	33.09
20	AU	58.1	499	1432	62.53	0.65	2.87	17.98	0.40	20.84
Mean		67.41	974.8	7241.15	68.17	1.43	7.37	45.18	0.82	39.94

Table 1: Open Access publications of NIRF-2020 top 20 institutions

Commercial publications										
NIRF Rank 2020	Name	NIRF Score	WoS Docs	Times Cited	% Docs Cited	CNCI	Citation Impact	% Docs in Q1 Journals	% Industry Collaborations	% International Collaborations
1	IIT-Madras	85.31	5982	22118	65.96	0.76	3.70	46.57	1.42	21.31
2	IISc	84.18	5813	25447	66.14	0.89	4.38	47.13	2.18	24.41
3	IIT-Delhi	81.33	6067	25680	65.73	0.89	4.23	45.96	1.14	18.53
4	IIT-Bombay	80.75	5973	23736	64.62	0.87	3.97	45.95	1.49	26.97
5	IIT-Kharagpur	75.85	6679	28787	68.44	0.92	4.31	45.95	0.91	19.15
6	IIT-Kanpur	74.99	4159	17163	66.67	0.88	4.13	42.95	1.49	23.42
7	IIT-Guwahati	68.81	4085	18109	69.35	0.90	4.43	44.59	0.42	16.08
8	JNU	68.76	2435	6539	50.31	0.73	2.69	30.08	0.04	16.92
9	IIT-Roorkee	68.48	4697	20894	70.73	0.91	4.45	36.24	0.36	17.63
10	BHU	62.03	3845	17651	67.98	0.86	4.59	32.07	0.31	19.69
11	CU	61.01	2685	8745	62.01	0.72	3.26	30.89	0.15	20.15
12	JU	60.77	4133	15806	63.15	0.84	3.82	31.16	0.29	16.84
13	AVV	60.74	3048	5385	42.98	0.70	1.77	33.87	0.33	11.02
14	MAHE	59.96	3115	8455	53.00	0.73	2.71	26.84	0.26	21.28
15	UoH	59.92	1735	7160	67.26	0.78	4.13	35.51	0.12	17.12
16	JMI	59.85	1819	9262	66.30	0.99	5.09	31.81	0.11	29.69
17	IIT-Hyderabad	59.59	1472	6094	66.51	0.98	4.14	41.96	0.68	21.26
18	UoD	58.97	4415	13883	58.62	0.74	3.14	30.03	0.16	19.07
19	SPPU	58.77	1870	6629	63.96	0.69	3.54	30.55	0.37	19.04
20	AU	58.1	3202	11821	61.31	0.73	3.69	25.19	0.06	14.87
Mean		67.41	3861.45	14968.20	63.05	0.83	3.81	36.76	0.61	19.72

Table 2: Commercial publications of NIRF-2020 top 20 institutions

Percentage of Web of Science documents:

Web of Science documents means the total number of Web of Science Core Collection papers & count includes all document types. As shown in figure 1, we have considered each institution's total publications 100% (OA & Commercial). MAHE has published maximum documents in open access journal with 40.45% of total publications followed by IISc with 29.02% documents and UoD with 27.62% documents. In contrast, IIT-Roorkee published only 12.21% of documents in open access journals. IIT-Roorkee has published maximum documents in commercial publications with 87.79%, followed by IIT-Kharagpur with 87.66% documents and JU with 87.60% documents publication. It's visible that universities are publishing more research papers in open access journals compare to IITs. The reason behind it Could be more journals available in the disciplines taught in universities then the engineering and technology under DOAJ (Jeyapragash, B & Muthuraj, A & Rajkumar, T. 2016). The other reason could be the promotion policy of IITs which consider SCI publications and more strict impact factors. Whereas Universities comparatively relax and also considers Scopus and care list publications.

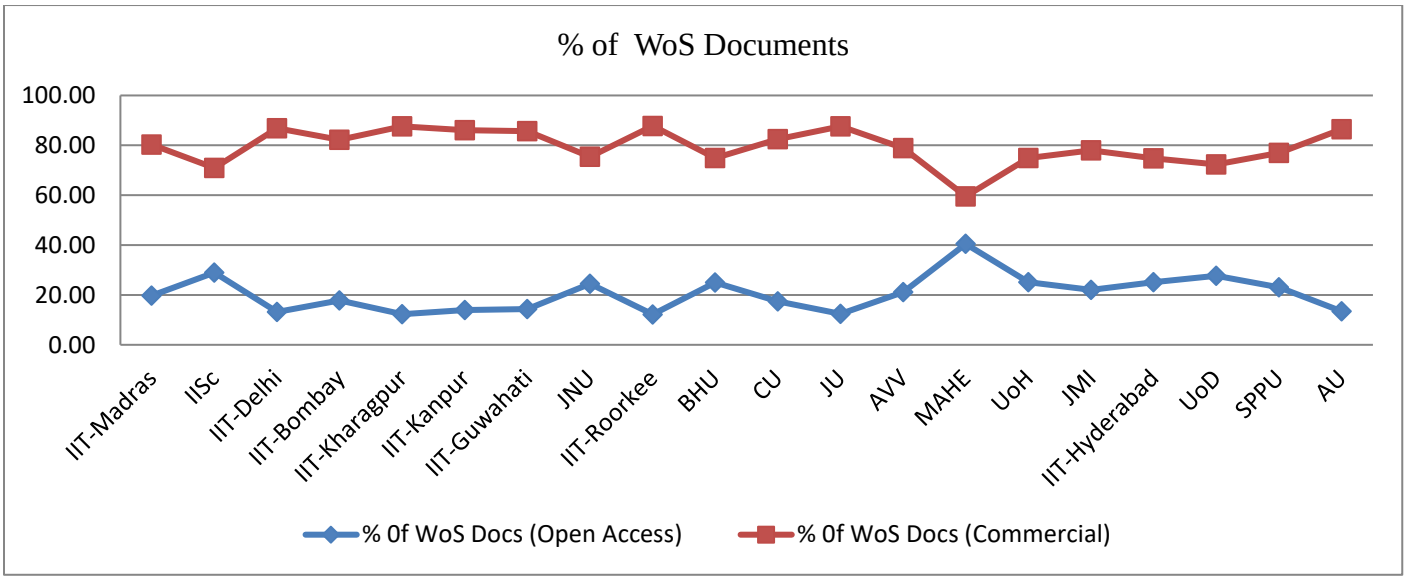

Figure 1: Percentage of Web of Science Documents.

Times cited:

As shown in figure 2, the UoD has received a maximum number of citations with 19710 in OA category, followed by IIT-Madras with 19370 citations and IISc with 14549 citations. In the commercial category, IIT-

Kharagpur has received maximum citations with 28787, followed by IIT-Delhi with 25680 citations and IISc with 25447 citations.

The figure 2 shows that most institutions received citations in the commercial publications except for UoD and IIT Hyderabad. One reason behind it may be that most of the institute published documents in the commercial publication, so citations count more in the commercial category.

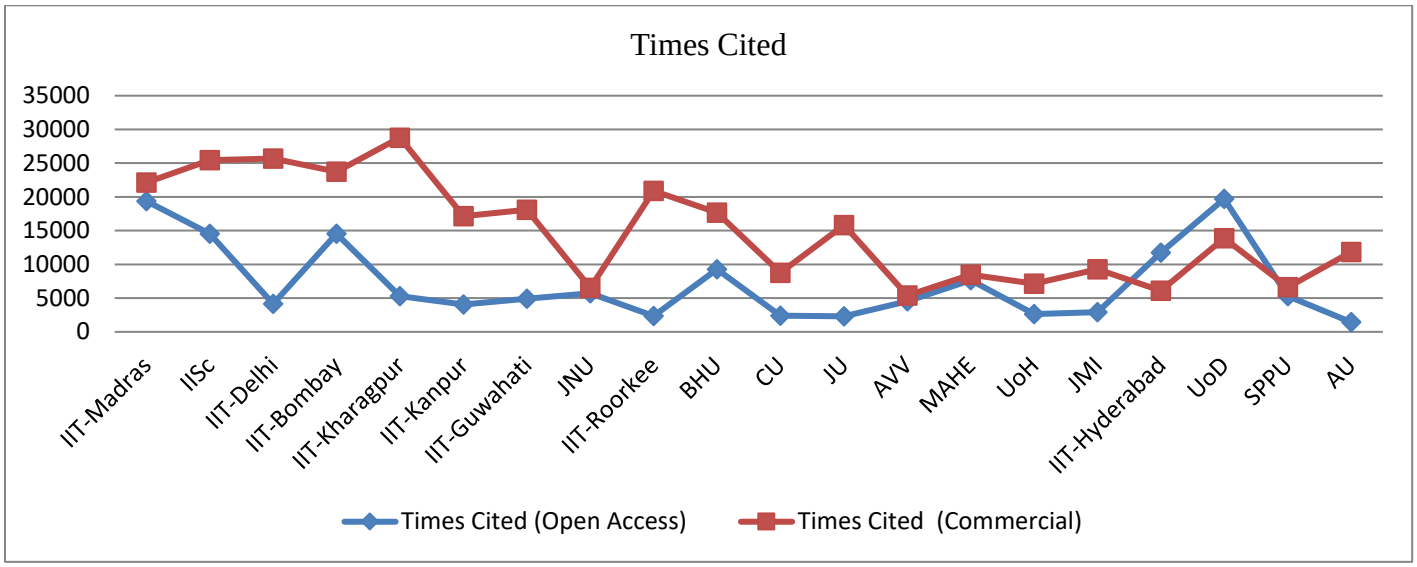

Figure 2: Times cited

Percentage of documents cited:

The % documents cited[15] means the Percentage of publications in a set that have received at least one citation. It shows how other researchers in the scientific community utilize the research output produced by an entity. In reverse thinking, this indicator shows the number of papers that did not get cited at all.(http://help.prod-incites.com/inCites2Live/indicatorsGroup/aboutHandbook/usingCitationIndicatorsWisely/docsCited.html).

The figure. 3 below shows that the Percentage of documents cited is more for the open access category than the commercial category. However, as far as the times cited is concerned, it is opposite (Figure 2.). IIT-Hyderabad got the maximum % of documents cited in the OA category cited with 82.42%, followed by IIT-Guwahati with 75.95% and IISc with 75.01; Amrita Vishwa Vidyapeetham University (AVV) received the lowest % of the document cited with 49.69%. IIT-Roorkee got the maximum % of documents cited with 70.73% in the commercial category, followed by IIT-Guwahati with 69.35% and IIT-Kharagpur 68.44%; AVV got the lowest % of the document cited with 42.98%. IIT-Kharagpur, IIT-Kanpur, CU, UoH, and Anna University (AU) have almost equal amounts of documents cited in both categories.

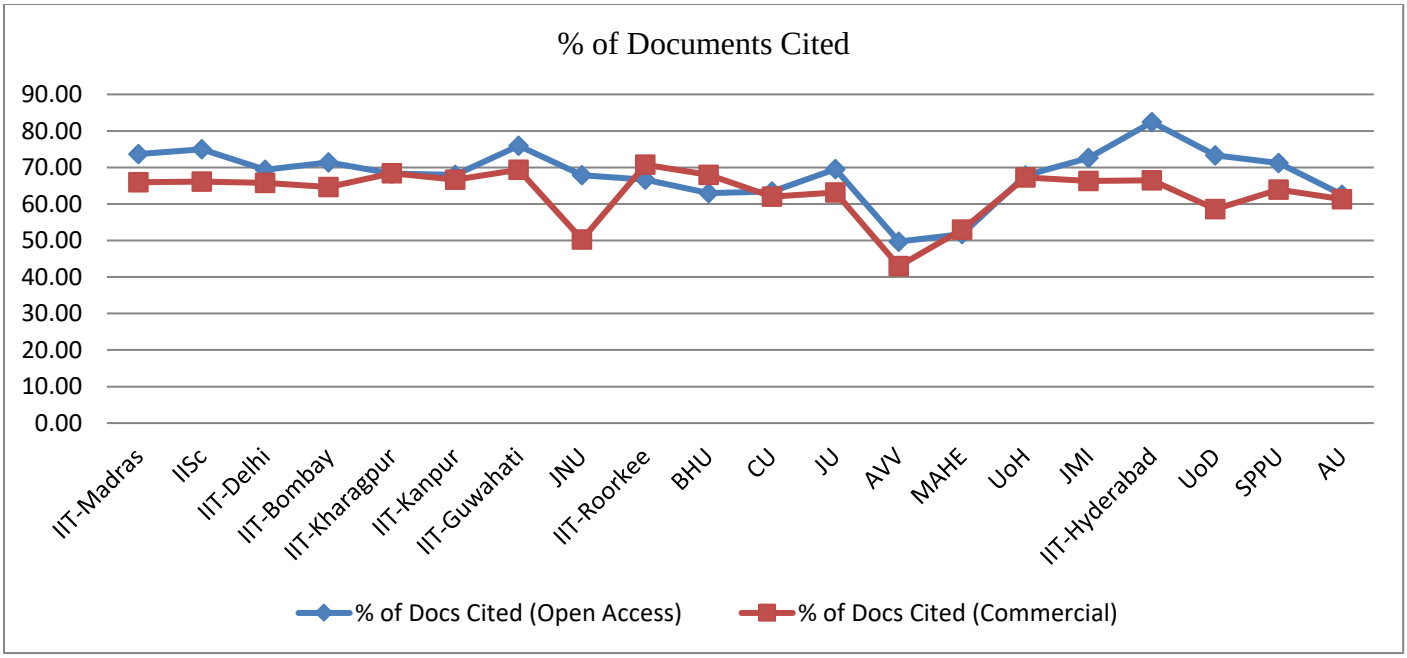

Figure 3: Percentage of documents cited

Category Normalized Citation Impact:

The Category Normalized Citation Impact (CNCI)[16] is the citation impact (citations per paper) normalized for the focused subject area, year of the publication (age), and type of the documents. When an article belongs to multiple WoS subject categories, the CNCI is calculated as CNCI = Times Cited / Category Expected Citations, where Category Expected Citations is the harmonic mean of all the categories a paper belongs to. It's used for large research groups, institutions, or geographic regions. The global mean of the CNCI is 1.0, so it is easy to compare a set of values to a benchmark.

IIT-Hyderabad has a maximum CCNI value with 3.60 among the top 20 institutions in the open-access category, followed by IISc impact value with 2.18 and UoD with 1.98 CNCI value. In the commercial category, Jamia Millia Islamia (JMI) has the maximum CNCI value with 0.99, followed by IIT-Hyderabad with 0.98 and IIT-Kharagpur with 0.92. In open access, category fifteen institutions have 1>CNCI value, whereas in the commercial category, all institutions 1<CNCI value. From figure 4, we can say that open-access documents are leading in research publications.

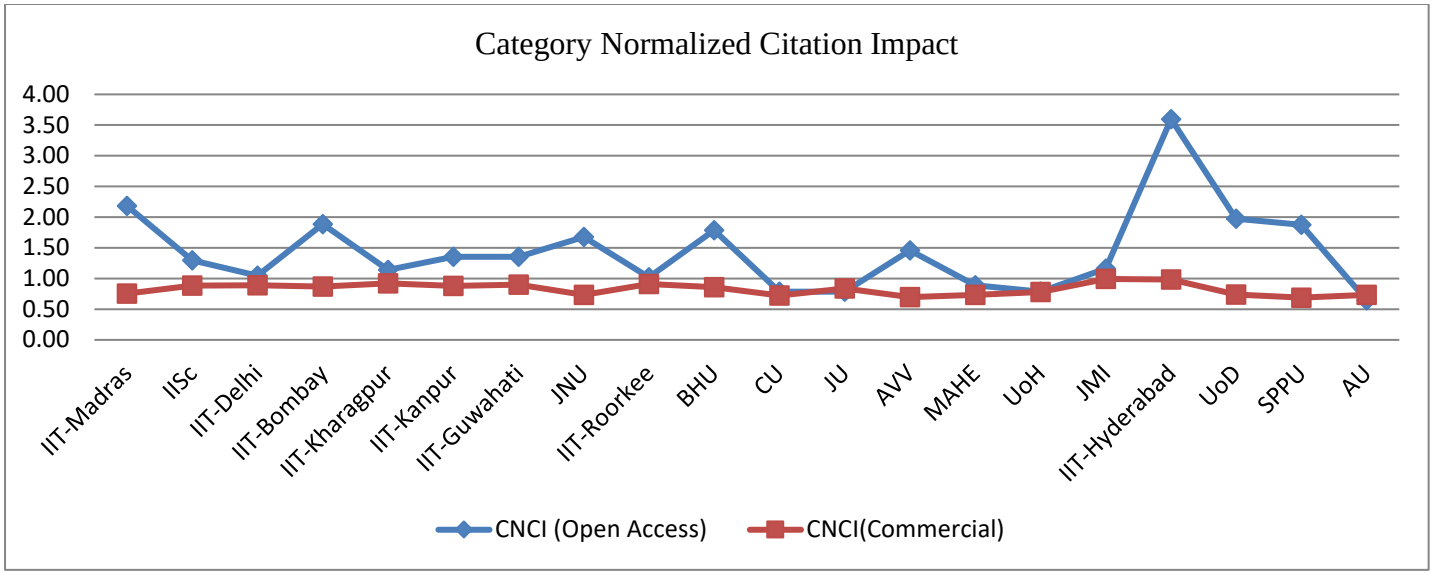

Figure 4: Category Normalized Citation Impact

Citation impact:

The Citation Impact of a set of documents is calculated by dividing the total number of citations by the total number of publications. Citation Impact shows the average number of citations that a document has received (CI= (ΣCitations / ΣPapers))[17]. IIT-Hyderabad has the maximum citation impact in the OA category with 23.73, followed by IIT-Madras with 13.23 and UoD with 11.70; AU is the lowest citation impact with 2.87. JMI has the maximum citation impact in the commercial category with 5.09, followed by BHU 4 with 4.59 and IIT-Roorkee with 4.45; AVV has the lowest citation impact with 1.77. The Figure 5 shows that most of the institute has maximum citation impact in the open-access category compare to the commercial category except IIT-Roorkee and AU.

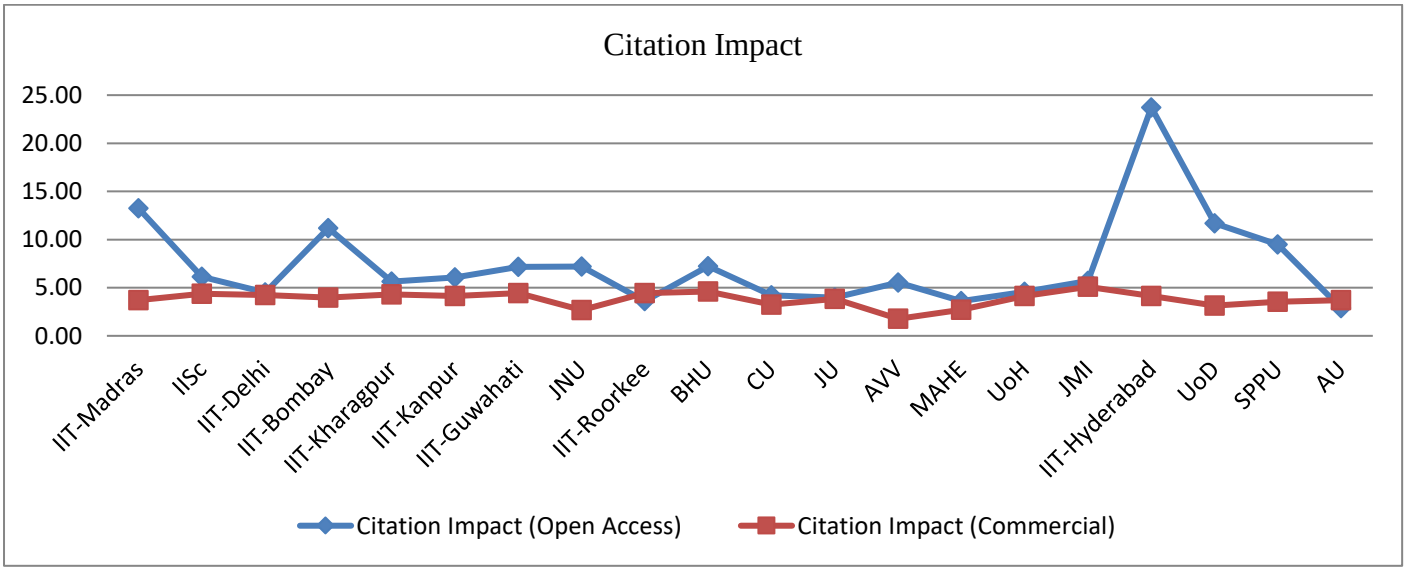

Figure 5: Citation impact

Percentage of documents in Q1 journals:

The Journal Impact Factor quartile is the quotient of a journal's rank in category (X) and the total number of journals in the category (Y), so that (X / Y) = Percentile Rank Z. (Q1: $0.0 < Z \leq 0.25$, Q2: $0.25 < Z \leq 0.5$, Q3: $0.5 < Z \leq 0.75$ & Q4: $0.75 < Z$.).[15] IIT-Hyderabad published a maximum number of documents in the OA category in Q1 journals, with 68.29% followed by IIT-Madras with 65.85% and IISc with 60.10%. IISc published the maximum number of documents in Q1 journals with 47.13% in the commercial category, followed by IIT-Madras 46.57% and IIT-Delhi 45.96%. AU is published the lowest number of documents in Q1 journals in both categories (OA is 17.98% and commercial is 25.19%). Figure 6 shows that most of the institutions published % of documents in Q1in open access category journals compared to the commercial category journals. Researchers publish their quality article in Q1 open-access journals for various reasons like more visibility of the article, maximum citation, etc.

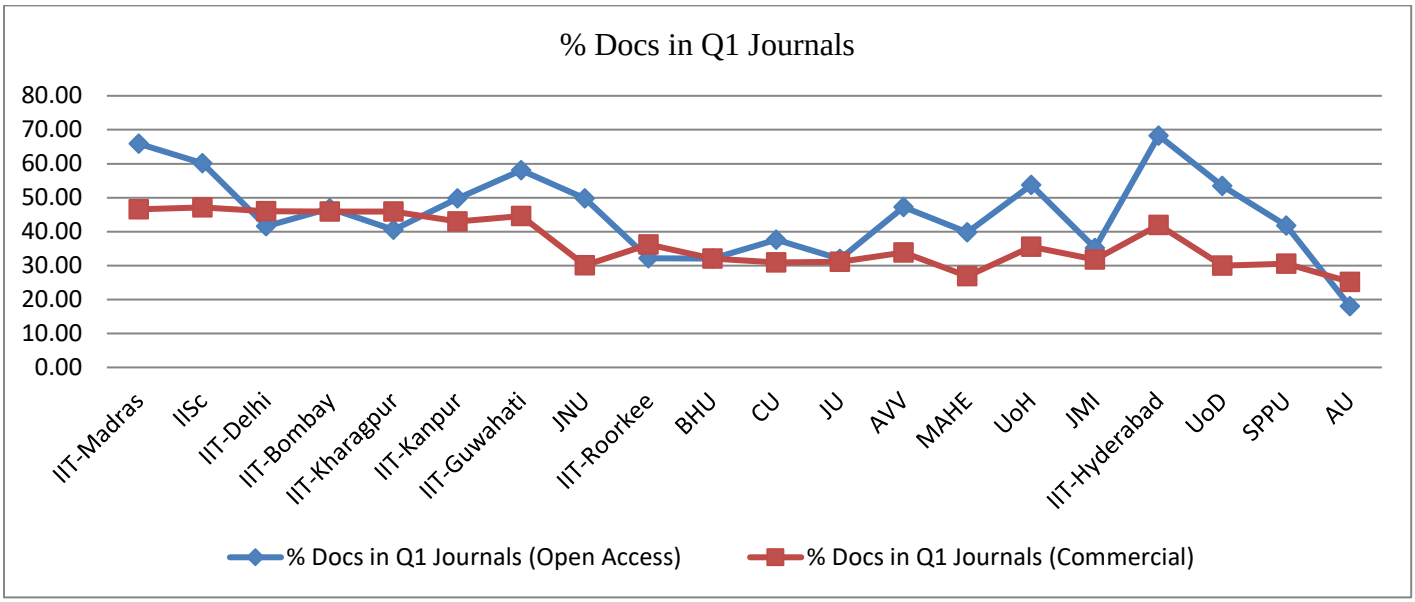

Figure 6: Percentage of documents in Q1 journals

Percentage of Industry collaborations:

An industry collaborative[15] publication organization type means "corporate" for at least one of the co-author's affiliations or Percentage of publications that have co-authors from Industry. The % of Industry Collaborations is the number of industry collaborative publications for an entity divided by the total number of documents for the same entity represented as a percentage.

IIT-Kanpur has the highest number of documents in the OA category with 1.94% Industry collaboration, followed by IIT-Delhi with 1.63% and IISc with 1.60%. JMI does not have industrial collaborate in OA category. IISc has the highest number of commercial category documents with a 2.18% Industry collaboration, followed by IIT-Kanpur and IIT-Bombay with the same Percentage of documents (1.49%). JNU has collaborated the lowest number of the document with 0.04%. Figure 7 shows that most institutions have industry collaboration in the OA category compared to the commercial category.

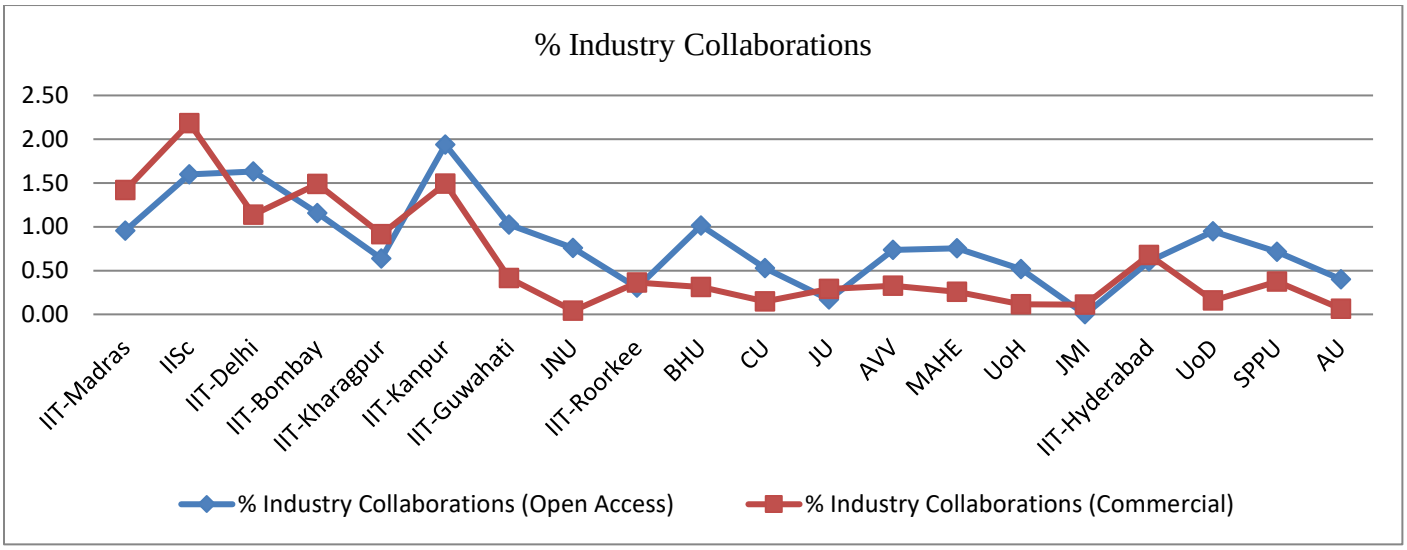

Figure: 7 Percentage of Industry collaborations

Percentage of International collaborations:

International Collaborations[15] means at least one the co-authors from outside of the country or Percentage of publications that have international co-authors. The % of International collaboration indicate an institution or author's ability to attract international collaborations.

IIT-Madras has collaborated the maximum number of documents internationally in the OA category, with 65.78% followed by IIT-Hyderabad with 62.42% and IISc of 50.90%. AU is the lowest position to collaborate internationally with 20.84% documents. JMI is the highest position in the commercial category, with 29.69% international collaborations followed by IIT-Bombay with 29.97% and IISc with 24.41% documents. AVV is the lowest position with 11.02% documents in international collaboration. It is visible that all institutions have published maximum documents with International collaboration in the OA category compared to commercial category documents publication.

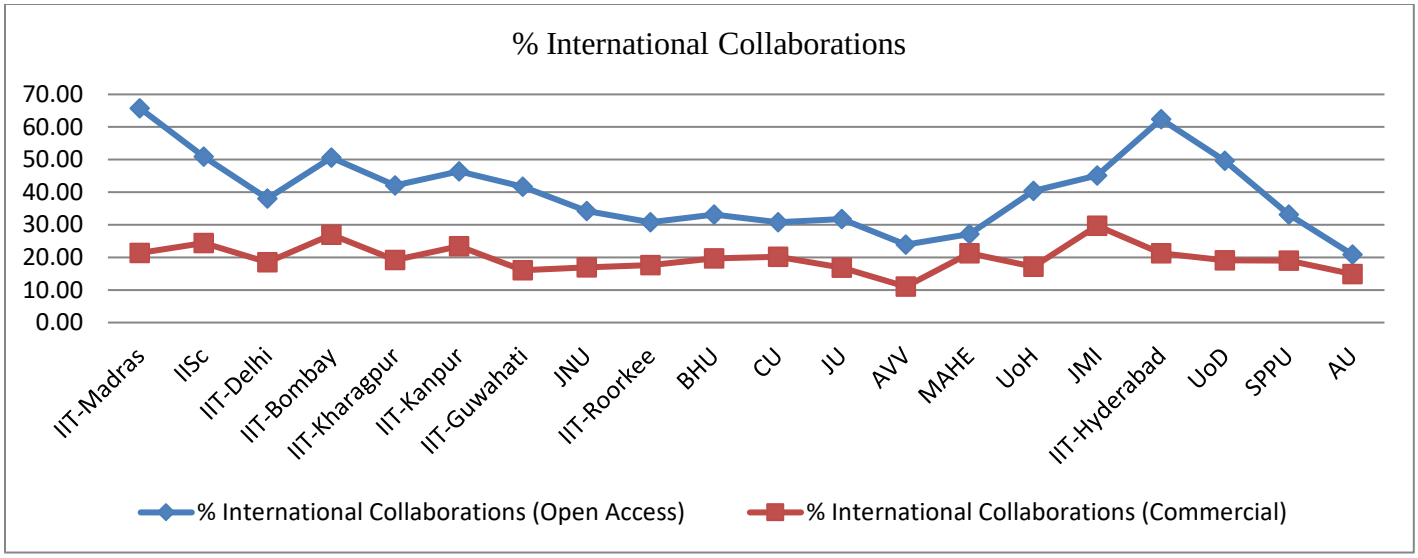

Figure 8: Percentage of International collaborations

Observation & Discussion:

To evaluate the Indian Institutions / Universities, the National Institute of Ranking Framework system has ranked them on quality parameters. Research publications are one of the significant factors in these parameters. Among top twenty institutions, the Manipal Academy of Higher Education (MAHE) (a privet university) published maximum documents in open access journals. At the same time, the IIT-Roorkee published minimum documents in the open-access journals. The maximum number of documents has been published in the commercial category, so citation count is more. Still, it is found that some institutions' citations count is more in open access categories like IIT-Hyderabad and the University of Delhi. In terms of percentage of documents citations among the top twenty institutions, sixteen institutions published more under open access categories than commercial publications. Fifteen institutions CNCI value is more than 1.00 in the open-access category, which is more than the global mean CCNI value. IIT-Hyderabad is on the highest position with 3.60 CNCI value. In the commercial category, all the institutions' CCNI value is less than 1.0. It is noticeable that eighteen institutions among the top twenties, citations impact, are more in open access documents than commercial documents except IIT-Roorkee and Anna University. In terms of the Percentage of documents published in Q1 journals, fifteen institutions published more documents in open access journals, and only five institutions published more documents in commercial journals. Percentage of industry collaboration twelve institutions among the top twenties collaborate more documents with industries co-authors in the open-access category. Only eight institutions collaborated more in the commercial category. Simultaneously, Jamia Millia Islamia (JMI) has no collaboration in the open-access category with Industry. In the Percentage of international collaboration, all the top twenties institutions collaborate more documents in the open-access category than the commercial category.

In this study, we have found that open access documents are leading in most of the categories. Institutions' productivity, impact, and collaboration are significantly makeable in open access document publications compare to the commercial documents publications. If the NIRF ranking gives some weightage to open access publications, the institutions will definitely promote publishing their research article to open access journals. We recommend that the publication in the open-access journals is the best way to reach the research publications of any institution's productivity, impact, and collaborations. This study helps rank agencies evaluate approaches or a new policy for parameters weighted and researchers interested in this field research.

Conclusion:

As addressed in the data analysis and observation and discussions, the contribution of open access publication is significant in almost all the top-ranking institution. Although to evaluate the Indian Institutions / Universities, the National Institute of Ranking Framework system has adopted quality parameters, and Research publications are one of the dominant factors in these parameters. Still, open access publications have not been given any weightage. In the analysis, it also came out that in comparison to commercial publications open access publication performs better on almost all the parameters either percentaaage of the document citeeed , industrial collooooboraaation, international collaboration or the citation impact article in Q1 journals.

I would suggest to include the open-access publication as a parameter in the NIRF ranking to encourage institutions to publish more in open access journals. Further, the NIRF should give separately weightage to open access research productivity, documents Impacts, and collaboration in ranking evaluation criteria. This study would help to further work out on the designing of the parameter in evaluating the institutions.

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