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Web visibility and research productivity of NIRF ranked universities in India: A Webometric study

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Abstract

This study aims to examine the website analysis of top 15 Indian universities ranked in NIRF (National Institutes Ranking Framework). The study focused on research productivity and webometric analysis which examine the domain, domain age, external and internal links, whereas all three types of web impacts of all respondent websites have been analysed. Study also examine usage of websites by stakeholder from inside and outside the country. For measuring research productivity of the respondent's universities, researchers has approached the Scopus database and analysed the no. of papers published, total citations received and h-index of respondent's universities. The present study used various tools like ahrefs SEO, Alexa for collection of the data and examines websites of universities of India covered in this study. Findings revealed that Anna University's website having a highest page authority score that is 59 out of a total of 100. It was found from the study that "Anna University" having a highest web traffic, backlinks and referring domains whereas University of Delhi's website achieved first

Alexa traffic global rank while Savitribai Phule Pune University's website achieved 1st Alexa traffic Indian rank. It was also found from the study that Bharathiar University's website achieved first position in all three web impact factors SWIF, IWIF and EWIF. It is observed from the findings that highest research produced by Indian Institute of Science followed by University of Delhi and Manipal Academy of Higher Education..

Keyword: World Wild Web, Webometrics Analysis, Web Impact Factor, Traffic Rank, Web Evaluation, Link Analysis, Backlinks, Referring Domain, Page Authority, Alexa Rank, research productivity, h-index

Introduction:

Websites provide a public interface for organizations around the world and a global entrance into the knowledge fountains of academic institutions. Assessing the impact of websites is of myriad concern to researchers because websites are now becoming the foremost source of information on research and academic accomplishments for an institution (Khan and Idress, 2014). Active presence of website of academic institution plays very vital role for information seekers like admission aspirants, current students, faculty members and other stakeholders. In the age of web, university websites are very significant for their stakeholders and there is a need to evaluate their positioning (Islam, 2011). Webometrics is a quantifiable study of web-related phenomena. The webometrics study could be applied to web with viable search engines providing the raw data. Measurable studies of the web have been named as webometrics by Almind and Ingwersen although the elementary issue had been acknowledged concurrently by Larson who is also a innovator with his initial exploratory link structure analysis with the first pure informetrics analysis of the web (Almind and Ingwersen, 1997; Larsen, 1996). Webometrics ranking is the system of rating websites based on composite indicators of visibility and activity measures (Khamala, Makori, and Njiraine, 2018). The webometric research concern with Web page content, Web link structure, Web usage and Web technology analysis (Björneborn & Ingwersen, 2004). "webometric is the study of the quantitative aspects of the construction and use of information resources, structures and technologies on the web, drawing on bibliometrics and informetric approaches" (Varadharajalu & Dhanavandan, 2017). The academic websites in the nations are the most important Internet communication tools. The significant factor for the

success of a university is its website and web approachability and in particular its visibility on the web. Hence, it is essential to assess their presence on the web as it is to evaluate the educational and research performance of the universities (Farzaneh et al., 2009).

The present study focused on link analysis, domain analysis, website speed analysis, page and domain authority, web traffic, backlinks and referring domains analysis, traffic rank analysis and web impact factor analysis of top 15 university websites of India ranked by NIRF. Study also explored to measure the research productivity of the respondent universities.

NIRF Ranking and its core parameters and weightages:

National Institutional Ranking Framework – NIRF is a competent body established by Ministry of Human Resource Development (MHRD) of Government of India. The major role of NIRF is to evaluate the all kind of institutions and universities and provide ranking based on the following parameters and methodology (NIRF, 2019):

1. Teaching, Learning & Resources (TLR) which includes students strength, student-faculty ratio, Ph.D. Faculty and Financial resources and its maximum utilizations. Total 0.30% weightages allocated in this parameter.
2. Research and Professional Practices (RP) which covers combined metrics of quality publications, Intellectual Property Rights (IPR), Patents, Footprints of project and professional practices etc. Total 0.30% weightages owed under this parameter.
3. Graduation Outcomes (GO) which comprises metrics of university examination and no. of Ph.D. research scholars graduated from the university. Total 0.20% weightages allocated for evaluating this parameter.
4. Outreach and Inclusivity (OI) contains students enrolled from other state and abroad in terms of regional diversity, percentage of women enrollment, economically and socially challenge students, provision of facility for physically challenged students. Total 0.10% weightages assigned for assessing this criteria.
5. Peer Perception (PP) comprises employers and academic peers and total 0.10% weightages allocated for evaluating this parameter.

Literature Review:

(Jati & Dominic, 2017) “The webometric ranking system is currently one of the most widely used methods to rank website quality including for university websites”. (Jhamb & Ruhela,

2017) analyses the websites of public libraries administered by the Ministry of Culture, Government of India. The author studied Domain and Page Authority, Link Analysis, Web Impact Factor of Public libraries websites. It was found that highest domain authority of 62. The Central Secretariat library is having the highest simple as well as external web impact factor 115.8. The highest number of external and links 6009 while that highest number of internal 465 links and highest IWIF of 24.25. (Noruzi, 2005) investigated the Web impact factors for Iranian Universities. He applied AltaVista search engine for links counts. The study revealed that overall Iranian university web sites have a lower Inlinks web impact factor. Study also revealed that there was significant correlation between the English language pages and back link counts and regional language not attract the attention from World Wide Web. (Varadharajalu, 2017) explored the Web Impact Factors of State Universities websites of Kerala. It was observed that the Shree Sankaracharya University of Sanskrit ranked 1(0.0035) in Self link Web Impact Factor. “National University of Advanced Legal Studies is in the 2nd (0.0032) rank in Self Link Web Impact Factor. The Kerala University is ranked 1 (0.00083) in External Link Web Impact Factor”. (Nwagwu & Agarin, 2008) analyzed data on web links form selected 30 Nigerian universities. Study findings discovered that 81.2% were inlinks and rest 18.8% were outlinks. It also reflects that websites seem to link more with non-academic website and has low level of deployment for sharing and propagation of information. (Verma & Brahma, 2018) studied on Webometrics analysis of websites of Indian Universities with status of potential for excellence on the criteria individual domain authority, number of web pages, domain authority, equity passing links, link pages, and web impact factor. It was pragmatic that the highest SWIF scores 201.82 was Jawaharlal Nehru University. (Pechnikov & Nwohiri, 2012) studied the webometrics study of Nigerian Universities. Study was focused on academic web presence of Nigeria and study of academic web structure of Nigeria. They used beta version of the BeeBot crawler for calculation of outlinks and assessment of the sizes of websites. Study observed that from total 97 universities, there were 1054 HTML pages and 98 outlinks. (Tafaroji et al., 2014) assessed webometrics study of Iranian medical universities based on the web visibility, size and rich files. The study findings indicated that maximum 220453 web pages and 14495 rich files found from Tehran University whereas lowest result revealed for Jiroft University of medical science. Further they also conducted significant relationship between webometrics rank and university rank and has positive relationship and provided suggestion to improve web visibility of Iranian

medical universities. (Verma & Brahma, 2017) explored a webometric analysis of National Libraries' websites in South Asia. It was revealed that National Library of India has highest domain and page authority. The national library of Shri Lanka has highest internal equity passing link and the highest web impact factor got national library of India. (Ahmad & Batcha, 2018) examines the web impact factor through a webometric study of 12 University Websites of Jammu and Kashmir. It observed that the Cluster University of Jammu ranked first in Internal Link WIF of Websites in Jammu and Kashmir. Shri Mata Vaishno Devi University ranked first in External Link Web Impact Factor. (Dastani, Panahi, & Sattari, 2019) explored webometrics analysis of Iranian Medical Sciences Universities. It was discovered that First-rank universities, as well as universities with the highest growth, all owns what a good website should have the basic contents and beyond. In one word, the results of this study showed that except a limited number of universities possess high-quality website, others have weak effect. There are few other studies also conducted for webometrics in India using various webometrics tools (Jayshankar and Babu, 2009; Jalal et al., 2009; Babu et al., 2010; Parmar and Mandalia, 2016). (Anyira & Njoeteni, 2020) conducted web visibility study of three Delta State Polytechnics. In the study findings suggested that formulation and implementation of good web policy at university level and promote publicity of website through social and academic platform and emphasis on involvement of personnel and students in the producing content on the institutions domains. (Stephen, 2020) undertaken website analytics of LIS link domain in India using search engine optimization. The study revealed that Organic Keywords (9444), Organic monthly traffics (7536), Domain score (24) in the latest month of December and LIS links have 5121 back links out of these 247 links are non-follow. A great score 84 out of 100 on pages SEO score reported in the study. (Anyira & Idubor, 2020) conducted systematic webometrics study of Nigerian higher institutions and finding of the study recommended university authority for improving institutions web visibility, increasing size of web content, uploading documents in rich files formats and improving scholarly research endeavors.

Objectives:

The main objective of this study is to examine the webometrics of the websites of Indian Universities. Other specific objectives include:

1. To find out the domain extensions and domain age, webpage speed, mobile responsive of respondent's universities website.
2. To examine the domain and page authority, website traffic, backlink and referring domains of respondent's universities websites.
3. To assess the global as well as Indian Alexa traffic rank of respondent's universities websites.
4. To find out the link analysis and calculate the web impact factor of respondents universities websites.
5. To investigate the research productivity of the respondents universities in India
6. To Examine the correlation between SWIF of universities with NIRF ranking of Indian Universities
7. To Inspect the correlation between research productivity of universities with NIRF ranking of Indian Universities

Scope and Limitation:

The present study focus on the webometric analysis of NIRF ranked Indian universities. As due to the time constraints, researchers has taken top 15 universities ranked assigned by National Institute of Ranking Framework (NIRF) in 2019. For measuring research productivity, study has approached only Scopus Database to assess the total research papers produced by each university, no. of citations and its h-index. As there are other databases/platform like WoS (Web of Science) and GS (Google Scholars) who also provides similar kind of analysis but not consulted in the study.

Research Methodology:

The present study examines a webometric analysis of top 15 university websites of India. The study confined 15 Indian universities from national institutional ranking framework website (NIRF, 2019) listed in table 1. The research method focused on examined the all 15 university websites by observation and collected the information of domain address. For webometrics analysis various tools are used to analyse and rank all university websites covered in the study. In order to collect data various small SEO tools used for collecting data like whois.com has been used to find out domain age, page speed, insights has been used to find out the page speed in mobile and desktop. The smallseotools.com has been used to calculate total, internal and external

links of websites. The Ahrefs SEO tool has been used to find out backlinks, referring domains and website traffic. The study used Alexa traffic rank to find out the website rank in global and India. For measuring research productivity of the respondent's universities, researchers has explored the Scopus database and analysed the no. of papers published, total citations, total authors and h-index. The website Page Speed calculated by the "Developers.google tool" (Google, 2019). Domain Authority is calculated by evaluating multiple factors, including linking root domains and number of total links, into a single DA score. ("Domain Authority | 2019 SEO Best Practices—Moz," 2019). For examine the correlation of NIRF ranking with SWIF (Simple web impact factor) and research productivity, study has used Palisade StatTools and presented the results.

Web impact factor was formed by Peter Ingwersen to evaluate the impact of a website by the number of links received (Ingwersen 1998). It is a quantitative instrument for calculating, positioning, assessing, arranging website. The three types of web impact factor are:

1. **SWIF** : (The simple web impact factor)
2. **IWIF** : (The internal web impact factor)
3. **EWIF**: (The external web impact factor)

SWIF: Simple web impact factor has been calculated by following formula

$$\frac{\text{Total number of links}}{\text{Total number of Webpages}}$$

IWIF: Internal web impact factor has been calculated by following formula

$$\frac{\text{Total Number of internal links}}{\text{Total number of Webpages}}$$

EWIF: External web impact factor has been calculated by following formula

$$\frac{\text{Total Number of external links}}{\text{Total number of Webpages}}$$

Results and discussion:

Table 1 reflects the information of the top 15 NIRF ranked universities with their establishment year, website URL and Domain Registration Date. It is noted that out of 15 universities Calcutta University is the oldest of all being established in 1857. It was also observed that Anna University having a oldest domain registered on 22nd May, 1998. The domain registration date considered by the “Who is domain lookup tool” (*Whois.Com - Free Whois Lookup*, 2020).

Table 1
List of universities and their websites

Sr. No.	Name of University	Abbreviation	State	Est. Year	Website URL	Domain Registration Date
1	Indian Institute of Science	IIS	Karnataka	1958	https://www.iisc.ac.in/	05-08-2015
2	Jawaharlal Nehru University	JNU	Delhi	1969	https://www.jnu.ac.in	28-02-2004
3	Banaras Hindu University	BHU	Uttar Pradesh	1916	http://www.bhu.ac.in	31-07-2003
4	University of Hyderabad	UH	Telangana	1974	https://www.uohyd.ac.in/	02-06-2011
5	Calcutta University	CU	West Bengal	1857	https://www.caluniv.ac.in/	30-11-2002
6	Jadavpur University	JU	West Bengal	1955	http://www.jaduniv.edu.in/	30-03-2010
7	Anna University	AU	Tamil Nadu	1978	https://www.annauniv.edu/	22-05-1998
8	Amrita Vishwa Vidyapeetham	AVV	Tamil Nadu	2003	https://www.amrita.edu/	14-08-1998
9	Manipal Academy of Higher Education	MAHE	Karnataka	1993	https://manipal.edu	27-09-1999
10	Savitribai Phule Pune University	SPPU	Maharashtra	1949	http://www.unipune.ac.in/	23-01-2009
11	Aligarh Muslim University	AMU	Uttar Pradesh	1920	https://www.amu.ac.in/	31-10-2003
12	Jamia Millia Islamia	JMI	Delhi	1988	https://www.jmi.ac.in/	21-12-2002

13	University of Delhi	DU	Delhi	1922	http://du.ac.in	28-02-2004
14	Bharathiar University	BU	Tamil Nadu	1982	https://www.b-u.ac.in/	19-09-2003
15	Institute of Chemical Technology	ICT	Maharashtra	2008	http://www.ictmumbai.edu.in	27-07-2009

It was also perceived from the table 1 that three universities from Delhi and Tamil Nadu state were achieved the palace in top 15 universities of India whereas two universities from each state of Karnataaka, Uttar Pradesh, West Bengal and Maharashtra has been achieved place in top 15 while from Telangana newly formed state also have only one university in top 15 ranked by NIRF. (NIRF, 2019) Table 1 also indicates that IIS had very recent domain registered in year 2015.

Table 2
Domain Extensions of Universities Websites

Sr. No.	Domain Extensions	No. of Universities	Percentage (%)
1	.ac.in	10	67%
2	.edu.in	2	13%
3	.edu	3	20%

Domain extension of website plays very important role while assessing the information from any website, domain is the main criteria to assess the authority of website. It is shows from the table 2 that out of 15 universities, 10 (67%) are having domain ‘.ac.in’ and 3(20%) universities are having a domain extension ‘.edu’ whereas only 2 universities (13%) are using ‘.edu.in’ domain. It is revealed from the table 2, that ‘ac.in’ domain has been widely used in the websites of top 15 universities website.

Table 3
Page Speed and Mobile Responsive of Universities Websites

No.	Name of University	Page Speed		Mobile Responsive
		Mobile	Desktop	
1	Indian Institute of Science (IIS)	10	43	Yes
2	Jawaharlal Nehru University (JNU)	22	53	Yes

3	Banaras Hindu University (BHU)	27	63	No
4	University of Hyderabad (UH)	67	78	No
5	Calcutta University (CU)	35	72	No
6	Jadavpur University (JU)	59	84	No
7	Anna University (AU)	61	78	No
8	Amrita Vishwa Vidyapeetham (AVV)	9	39	Yes
9	Manipal Academy of Higher Education (MAHE)	48	71	Yes
10	Savitribai Phule Pune University (SPPU)	92	94	No
11	Aligarh Muslim University (AMU)	6	50	No
12	Jamia Millia Islamia (JMI)	76	87	No
13	University of Delhi (DU)	77	89	Yes
14	Bharathiar University (BU)	41	82	Yes
15	Institute of Chemical Technology (ICT)	9	50	No

Table 3 indicates the page speed and mobile responsive website. Now-a-days it is expected that websites should be mobile responsive because of growing rate of internet users from the mobile devices. “Page Speed shows the performance of a page on both mobile and desktop devices. A score of 90 or above is considered fast, and 50 to 90 is considered moderate. Below 50 is considered to be slow”. (Google, 2019.). It was observed that SPPU has having the highest website speed in mobile while AMU having the lowest website speed among the all universities. It was revealed that SPPU having the highest website speed in desktop and AVV having the lowest website speed in desktop among the all university. The website Page Speed calculated by the “Developers.google tool” (Google, 2019)

It was originated that 9 Universities website are not mobile friendly whereas 6 Universities website are mobile responsive. (“Mobile-Friendly Test—Google Search Console,” 2019). Results of mobile responsive website is not encouraging and it is alerting to administrators of universities that most of information seekers using a mobile device to access information and it is suggested that website of top ranked universities should be mobile responsive.

Table 4
Domain and Page Authority

Sr. No.	Name of University	Domain Authority	Page Authority
1	Indian Institute of Science (IIS)	52	51
2	Jawaharlal Nehru University (JNU)	59	58
3	Banaras Hindu University (BHU)	52	56
4	University of Hyderabad (UH)	46	52
5	Calcutta University (CU)	50	55
6	Jadavpur University (JU)	41	52
7	Anna University (AU)	54	59
8	Amrita Vishwa Vidyapeetham (AVV)	54	55
9	Manipal Academy of Higher Education (MAHE)	53	50
10	Savitribai Phule Pune University (SPPU)	52	55
11	Aligarh Muslim University (AMU)	54	55
12	Jamia Millia Islamia (AMI)	51	53
13	University of Delhi (DU)	62	54
14	Bharathiar University (BU)	38	52
15	Institute of Chemical Technology (ICT)	36	49

Domain and Page Authority is a search engine ranking score out of 100 that predicts how well a website will rank on search engine result pages (SERPs). Domain Authority is calculated by evaluating multiple factors, including linking root domains and number of total links, into a single DA score. (“Domain Authority | 2019 SEO Best Practices—Moz,” 2019). It is observed from Table 4 that the DU website achieved highest DA score 62 while Institute of ICT website domain authority score obtained only 36 out of a total of 100 points which is very lowest score among respondent universities. Among the top fifteen university website the highest page authority score is 59 achieved by AU whereas lowest is 49 achieved by ICT website. The domain

Authority and page Authority is calculated by the “Domain Authority Checker tool” (“Domain Authority Checker – DA Checker – Check Domain Authority,” 2019)

Table 5
Website traffic, Backlink and Referring Domains

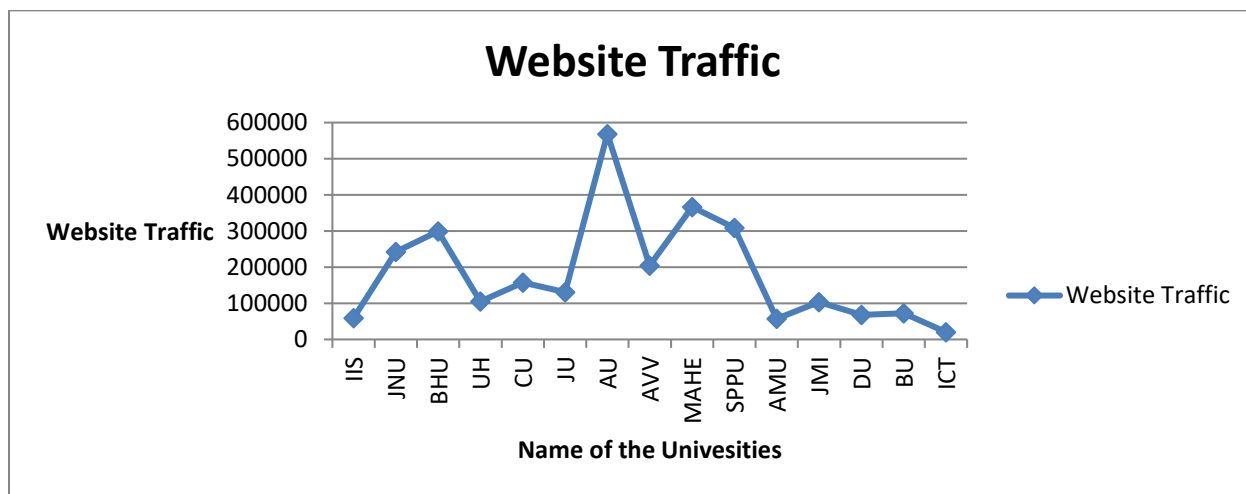
No.	Name of University	Website Traffic	Backlinks	Referring Domains
1	Indian Institute of Science (IIS)	59105	12710	1192
2	Jawaharlal Nehru University (JNU)	242286	13303	428
3	Banaras Hindu University (BHU)	299195	97386	2844
4	University of Hyderabad (UH)	105350	13158	1079
5	Calcutta University (CU)	157486	174160	2168
6	Jadavpur University (JU)	130447	14218	1184
7	Anna University (AU)	568441	656177	3854
8	Amrita Vishwa Vidyapeetham (AVV)	203984	146572	1641
9	Manipal Academy of Higher Education (MAHE)	365935	23448	1779
10	Savitribai Phule Pune University (SPPU)	308833	47067	1686
11	Aligarh Muslim University (AMU)	57735	220725	3468
12	Jamia Millia Islamia (AMI)	103351	17203	1999
13	University of Delhi (DU)	68233	13633	711
14	Bharathiar University (BU)	72611	919	109
15	Institute of Chemical Technology (ICT)	20310	9298	890

Website traffic refers to web users who visit a website. Web traffic is measured by number of visits on particular website during the period. Table 5 shows that how many users have visited the website of top 15 universities in month of February 2020. It was discovered that highest web

traffic of among the respondent universities is achieved by AU website and 568441 visitors have visited the web page during the period of this study followed by MAHE website, SPPU website and BHU website whereas ICT website have the lowest web traffic. The Website Traffic, Backlinks and Referring Domains calculated by the “Ahrefs—SEO Tools” (“Ahrefs—SEO Tools & Resources To Grow Your Search Traffic,” 2019) which is reflects in graph 1.

Graph 1

Website Traffic of Respondent Universities



Backlink is a link of one website you are getting from another website. Which indicates that you can access your require information from the one website to another website. It shows particular website link used in other website. Referring domains are websites from which the target website or web page has one or more backlinks. AU website have highest 656177 backlinks in 3854 referring domain whereas BU website has only 919 backlinks in 109 referring domain.

Table 6

Universities’ Websites and their Alexa Ranks

No.	Name of University	Alexa Rank(Global)	Rank	Alexa Rank(India)	Rank
1	University of Delhi (DU)	5678	1	2745	4
2	Savitribai Phule Pune University (SPPU)	9444	2	854	1
3	Anna University (AU)	26981	3	1859	2
4	Indian Institute of Science (IIS)	37138	4	3159	5

5	Manipal Academy of Higher Education (MAHE)	42728	5	2419	3
6	Amrita Vishwa Vidyapeetham (AVV)	47728	6	4936	6
7	Banaras Hindu University (BHU)	49314	7	5178	8
8	Jamia Millia Islamia (JMI)	52012	8	5001	7
9	Jawaharlal Nehru University (JNU)	53519	9	5410	9
10	Aligarh Muslim University (AMU)	60202	10	6281	10
11	University of Hyderabad (UH)	91886	11	9752	11
12	Bharathiar University (BU)	100494	12	10209	12
13	Jadavpur University (JU)	105566	13	14751	13
14	Calcutta University (CU)	140824	14	19442	14
15	Institute of Chemical Technology (ICT)	344809	15	59573	15

Table 6 shows, the Alexa traffic global and Indian ranks that are calculated for the top 15 Indian universities. Accordingly, the universities' websites are ranked based on Alexa global and Indian traffic rank. DU, SPPU, AU, IIS, MAHE, AVV achieved 1 to 6 ranks respectively in both ranks. BHU and JMI University occupied global ranks compared to Indian ranks 7-8, 8-7. AMU, UH, BU, JU, CU, ICT rank 10 to 15 respectively in both global and Indian ranking.

Table 7
Link Analysis and Web Impact Factor

SN	Name of University	Web page	Total Links	Internal Links	External Links	SWIF	IWIF	EWIF
1	Indian Institute of Science (IIS)	3800	297	252	45	0.078	0.066	0.012
2	Jawaharlal Nehru University (JNU)	3860	436	402	34	0.113	0.104	0.009
3	Banaras Hindu University (BHU)	15200	253	235	18	0.017	0.015	0.001
4	University of Hyderabad (UH)	11300	472	436	36	0.042	0.039	0.003
5	Calcutta University (CU)	13500	94	69	25	0.007	0.005	0.002

6	Jadavpur University (JU)	9730	228	197	31	0.023	0.020	0.003
7	Anna University (AU)	11400	97	69	28	0.009	0.006	0.002
8	Amrita Vishwa Vidyapeetham (AVV)	52700	251	244	7	0.005	0.005	0.000
9	Manipal Academy of Higher Education (MAHE)	59300	177	167	10	0.003	0.003	0.000
10	Savitribai Phule Pune University (SPPU)	14400	72	38	34	0.005	0.003	0.002
11	Aligarh Muslim University (AMU)	55400	196	188	8	0.004	0.003	0.000
12	Jamia Millia Islamia (JMI)	23500	215	2013	12	0.009	0.086	0.001
13	University of Delhi (DU)	118000	300	249	51	0.003	0.002	0.000
14	Bharathiar University (BU)	443	244	192	52	0.551	0.433	0.117
15	Institute of Chemical Technology (ICT)	1230	260	244	16	0.211	0.198	0.013

Table 7 shows the link analysis and web impact factor of universities websites of India. It was noticed that BU having a highest web pages of 1,18,000 among the all selected universities website. From the table it is noted that BU is in the first position with 0.551 of simple web impact factor. ICT has the second place with 0.211, JNU is in the third place with 0.113 and IIS has the fourth place with 0.078 and UH occupies the fifth place with 0.042.

In the internal web impact factor BU is in the first position with 0.443 of simple web impact factor. ICT has the second place with 0.198, JNU is in the third place with 0.104 and JMI has the fourth place with 0.086 and IIS occupies the fifth place with 0.066.

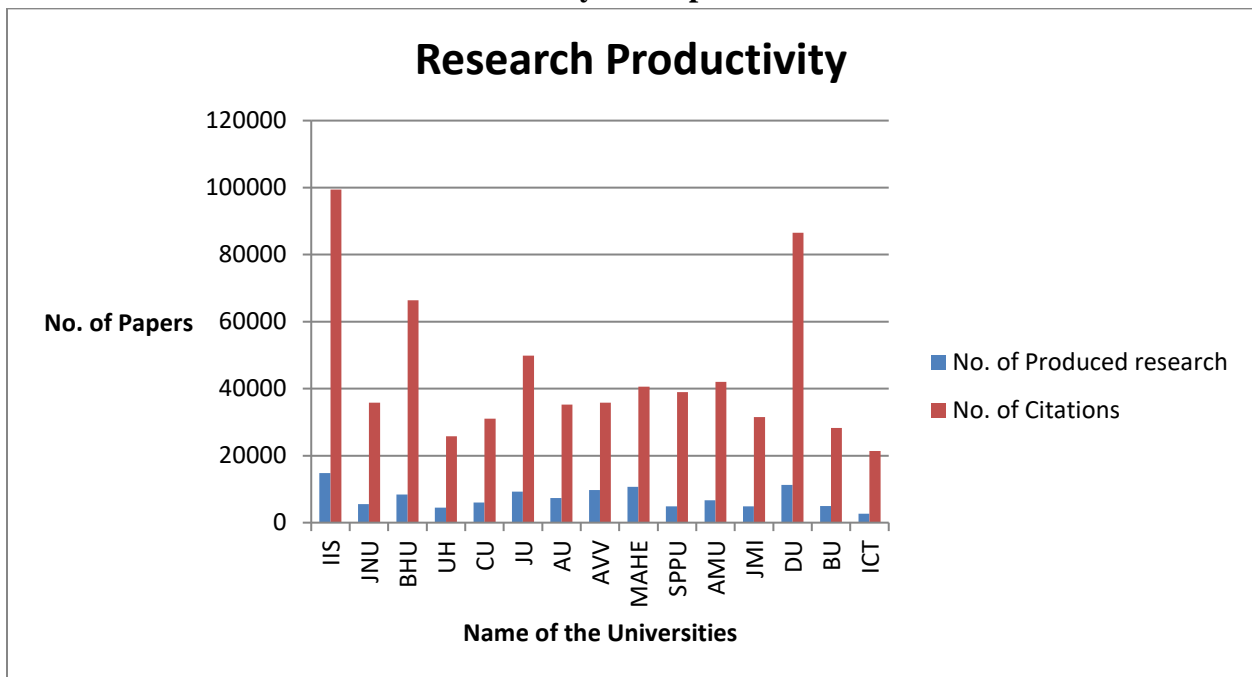
In the External web impact factor BU is in the first position with 0.117 of simple web impact factor. ICT has the second place with 0.013, IIS is in the third place with 0.012 and JNU has the fourth place with 0.009 and JU occupies the fifth place with 0.003. It was also notices that BU having first position in SWIF, IWIF and EWIF. ICT has the second position in SWIF, IWIF and EWIF.

Table 8
Research Productivity of Sample Universities (Last Five years 2016-2020)

Sr. No.	Name of University	Affiliation ID	No. of Records Scopus	No. of Citation Scopus	h-Index Scopus
1	Indian Institute of Science (IIS)	60014097	14825	99452	83
2	Jawaharlal Nehru University (JNU)	60030622	5490	35778	53
3	Banaras Hindu University (BHU)	60008721	8370	66394	75
4	University of Hyderabad (UH)	60029516	4439	25777	50
5	Calcutta University (CU)	60024232	5999	31069	44
6	Jadavpur University (JU)	60020825	9227	49841	56
7	Anna University (AU)	60021176	7341	35259	56
8	Amrita Vishwa Vidyapeetham (AVV)	60076781	9752	35773	50
9	Manipal Academy of Higher Education (MAHE)	60016524	10719	40555	55
10	Savitribai Phule Pune University (SPPU)	60031475	4824	38982	57
11	Aligarh Muslim University (AMU)	60032269	6633	41974	65
12	Jamia Millia Islamia (JMI)	60020458	4819	31554	56
13	University of Delhi (DU)	60029284	11260	86508	84
14	Bharathiar University (BU)	60013041	4949	28285	55
15	Institute of Chemical Technology (ICT)	60006361	2693	21377	47

Table 8 shows the last five years of research productivity of respondents universities based on the Scopus database. The data was taken for the period 2016 to 2020. It is revealed that maximum research papers of 14825 were published by IIS followed by 11260 by DU and 10719 from MAHE. As minimum research productivity was showing by ICT with 2693 followed by 4819 from JMI and 4824 from SPPU. The maximum citations of 99452 were received by IIS followed by 86508 from DU and 66394 from BHU. From the table it is also observed that highest h-index was received by DU with 84 followed by IIS with 83 and BHU with 75. The graphical representation of the research productivity of the respondent's university is mentioned at Graph 2.

Graph 2
Research Productivity of Respondent Universities



As besides, researchers has also checked the correlations between NIRF Ranking with SWIF using Palisade StatTools (<https://www.palisade.com/stattools/default.asp>).

The results of the linear correlation are presented in the Table 9

Table 9
Linear Correlation: NIRF with SWIF

Initial with all data	Simple Web Impact Factor Data Set	NIRF Adjusted rank score Data Set
SWIF Rank	1.0000	0.164
NIRF Rank	0.164	1.000

It is observed from the table 9 that the linear value is < 0.5 , hence there is no correlation found between NIRF rankings with Simple Web Impact Factor (SWIF) of the respondents' universities.

Furthermore we also performed and measured the correlation between NIRF Ranking with research productivity of the respondent's university using same tool.

The results of the linear correlation are presented in the table 10

Table 10
Linear Correlation: NIRF with Research Productivity

Initial with all data	NIRF Adjusted rank score Data Set	Research Productivity Data Set
NIRF Rank	1.0000	0.311
Research Productivity	0.311	1.000

The results of the linear correlation revealed that the linear value is < 0.5 , hence there is no correlations observed between NIRF Ranking with research productivity of the university.

Conclusion:

It is well-known that website of academic institution is a very important tool to access various information about organization. Website plays very significant role to attract prospective students and other stakeholders and they must access all the information about institutions without physical visit at any time anywhere without any boundaries. Reliable, effective and attractive website is gateway and handy tool for creation of good branding of university and support in promotion of educational activities to attract potential students, faculty members and

research scholars at university. Stakeholders of the university willing to access information related to courses offered, academic program brochures, admission process, syllabus, working hours, resources and facilities offered by the institutions, library & learning resources, various academic announcements and research activity through the website of university.

The present study provides Webometric information about the websites of top 15 NIRF ranked Indian universities. Overall findings revealed that Bharathiar University (BU) website achieved highest web impact factor followed by Institute of Chemical Technology (ICT) website among the respondent universities websites. Anna University (AU) website having a highest page authority score that is 59 out of a total of 100 and the highest web traffic, backlinks and referring domains whereas University of Delhi (DU) website achieved first Alexa traffic global rank while Savitribai Phule Pune University (SPPU) website achieved 1st Alexa traffic Indian rank. It was revealed from the study that only 6 university's websites are mobile responsive which is a lower number. Academic administrators of the concern universities needs to focus on it as young generation use mobile with internet connectivity extensively.

With regards to research productivity, study results observed that maximum research papers was published by IIS followed by MAHE and DU whereas maximum citation was reported by IIS followed by DU and BHU. The highest h-index was found from DU, followed by IIS and BHU. The present study also discovered the correlations of NIRF ranking with SWIF and research productivity. It was revealed that linear correlation for SWIF (0.164) and research productivity (0.311) reported hence the results was < 0.5 and hence there was no correlation between them.

Overall findings of the results indicate that NIRF ranked university has a low visibility in terms of external link and reported very poor EWIF (external web impact factor). It is recommended that university authority need to prepare a long term plan and establish sound policy to promote and create sound web policy so it will improve its web presence in the globe. University research must be uploading faculty and scholar work in the respective institutional repositories and it must link with university website to increase its visibility. Also for improving the web visibility, the domain of various university research centers must be cover under main web domain of the university.

As researchers has attempted to complete the present study with specific core objectives. Future study can be conduct using other webometrics parameters with extensive scope. There are many other criteria and tools available to measure the web impact factors of the university like using RWIF (revised web impact factor), using WISER Law, and calculating rich file formats with webometric study of different kind/discipline of the academic institutions in India.

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