

Assessment of Top Ten NIRF 2020 Rank Universities Libraries: A Webometric Study

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ABSTRACT

Websites serve as information gateways and play an important role in information dissemination. The aim of this study is to examine the library websites of the Top 10 Universities that have been ranked by the National Institutional Ranking Framework (NIRF) for the year 2020. This study investigates the efficiency of library websites using webometric indicators and examines the University's library websites based on various links, and ranks the websites on the basis of their internal and external web impact factors. The result visualized that the web impact factor of the library website of Jamia Millia Islamia is the highest followed by the library website of the Indian Institute of Science and the library website of Manipal Academy of Higher Education among the top 10 University library websites. The study's findings will assist webmasters and library professionals in overcoming the limits that users confront and improving their websites.

Keywords: Webometric, Websites, Libraries website, NIRF, Links, Web impact factor, etc. Impact Factor.

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INTRODUCTION

Websites are essential coordination accessories that may be used to support a vast range of inter organizational communication (Thelwall and Zuccala, 2008) Today's communication relies heavily on the use of websites. Individual's organizations, libraries, and other entities utilize. It not just to promote their capabilities, but also to access the vast amount of information that is now available on the internet. These websites serve as gateways into the virtual world as well as exit points from the real world. The right to information can only be fulfilled by the right to have access to information (Koren, 2000).

The library's websites serve as the primary source of information since browsing the internet for information is believed to be more convenient than travelling to the library and looking for books on the shelves. As libraries evolve into the digital world, our online presence becomes increasingly important in meeting the requirements of our patrons. In the age of the internet, the pattern of teaching and learning in the academic sector has drastically changed. Previously, online apps were simple and used a static page design; however, today's sites offer comprehensive applications with user interfaces.

Libraries play an important role in the dissemination of information. Libraries have always played a vital role in the distribution of information as a social commodity, from clay tablets to card catalogues to digital catalogues. In order to connect with their users, librarians have become early adopters of social networking technology as an extension of their conventional profession.

LITERATURE REVIEW

Jeyshankar and Ramesh Babu, (2009) conducted a webometric analysis of 27 states and 18 private universities from Tamil Nadu. The major objective of this study was to calculate web impact factor at different levels of domain system. By using Alta Vista search engine, they analyze the websites, identify domain system and calculate number of web pages, link pages, self-link pages and external link pages. They also calculate simple Web Impact Factor, self-link Web Impact Factor, external Web Impact factor and rank these universities as per web impact factor. The study revealed that web pages of few universities was higher but the link pages were limited and websites lags behind in their simple web impact factor, self-link web impact factor and external link web impact factor.

Babu *et al.*, (2010) examined 40 central universities out of 41 central universities of India as Tamil Nadu Central University does not have a website. The major aim of the study is to provide ranking of these universities by using WIF. They study website domain structures, evaluate the number of websites, link pages



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and measure the simple web impact factor, web impact factor for self-links, web impact factor for external links and revised web impact factor for Central Universities in India and ranked the websites according to the WIF. For collecting data, they used AltaVista search engine. A new network diagram is also being created. This Webometric Analysis, showed relation structures between web nodes. To show the link structure they created a network diagram between web nodes. This study gives a reasonable idea of the data provided by the websites of India's 40 central universities.

Verma and Brahma, (2017) analysed link pages and web pages of National Library websites in South Asian countries included Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka by using Open Site Explorer optimization tool and calculates Simple Web Impact Factor, Internal Link Web Impact Factor, External Link Web Impact Factor. They also ranked the websites according to the WIF. After the analysis they found that the National Library of India leads highest Domain Authority Page Authority, External Equity-Passing Links, Total Equity-Passing Links, Total External Links and Total Links. And National Library of Sri Lanka got the highest Internal Equity-Passing Links and Total Internal Links. Whereas National Library of India got highest web impact factor among the national libraries' websites.

Objectives of the Study

The present study aimed to analytically analyze the websites/webpage's of Universities Libraries in India. The specific objectives of the study are to:

Evaluate the search engine performance of university library websites.

Examine the number of internal link and external link of university library websites.

Calculate the web impact factor of university library websites and rank them as per WIF.

RESEARCH METHODOLOGY

The aim of this study is to conduct a webometric analysis of Top ten NIRF (2020) ranked Universities library (Table 1) websites by evaluating search engine performance and calculating the WIF of each Library website. In the present study survey method and observation method are used.

For the collection of primary research data following tools are used

For link analysis, an online web optimization search engine tool was used, i.e., Link Explorer (<https://moz.com/>), formerly known as Open Site Explorer. It has been developed by Moz.com to track links to a specific website.

For the analysis of the web page size and download speed of the selected libraries' websites/webpage's we are going to use a Website Optimization tool called Web Page Analyzer (<http://www.websiteoptimization.com/services/analyze/>).

For the world ranking of the selected libraries' websites, we are going to use an online tool named Alexa Traffic Rank (www.alexa.com/siteinfo/).

For the evaluation search expression performance of library websites, we are going to use Google search engine.

Data Analysis and Interpretation

Search engine performances in webometric research of university's library website.

In the process of retrieving information from the internet, a search engine is essential. Information retrieval tools such as search engines are frequently used. For getting data from the web, these are widely utilised in webometric research.

The performance of a search expression can be measured in two ways, as shown below:

Search expression (without gap).

Example-site: www.ignou.ac.in/ and link: www.ignou.ac.in/

Search expression (with gap).

Example-site: www.ignou.ac.in/ and link: www.ignou.ac.in/

Search Engine Performance of University's Library Website with Site Command (Site: Url and Site: Url).

Five rounds of data were collected (from date: 10.07.2021 to 18.07.2021) from University Libraries' websites every alternate day (The details about collected data is given in appendix-ANX-1A to 1E) to see the consistency of research data, and an average of five rounds data was analysed in Table 2 to show the average result of search engine performance of library websites of top 10 Universities listed by NIRF during the year 2020 with a site command site: URL and site: URL (Without gap and with gap) and The study discovered significant changes in search result performance when the same search term was used without and with a gap after command.

Table 2 Average of University's library websites with site command site: URL and site: URL.

Search Engine Performance of University's Library Website with Link Command (Link: Url and Link: Url).

Table 3 shows the average result of search engine performance of library websites of top 10 Universities listed by NIRF during the year 2020 with a link command link: URL and link: URL (without gap and with gap) and it was found that, similar to the Table 2, there are substantial changes in search result performance when employing the same search expression with and without a gap

Table 1: Top 10 Universities listed by National Institutional Ranking Framework.

Sl. No.	Universities	Library Hyperlink
1	Indian Institute of Science, Bangalore.	(https://www.iisc.ac.in/jrd-tata-memorial-library/)
2	Jawaharlal Nehru University, New Delhi.	(http://lib.jnu.ac.in/)
3	Banaras Hindu University, Varanasi.	(https://www.bhu.ac.in/lib/)
4	Amrita Vishwa Vidyapeetham, Coimbatore.	(https://www.amrita.edu/department/library)
5	Jadavpur University, Kolkata.	(http://122.15.82.40:9900/)
6	University of Hyderabad, University.	(http://igmlnet.uohyd.ac.in:8000/)
7	Calcutta University, Kolkata.	(https://www.culibrary.ac.in/)
8	Manipal Academy of Higher Education, Manipal.	(https://manipal.edu/mu/campus-life/around-campus-facilities/libraries.html)
9	Savitribai Phule Pune University, Pune.	(http://lib.unipune.ac.in:8002/)
10	Jamia Millia Islamia, New Delhi.	(http://jmi.ac.in/zhlibrary)

after the command. To analyse the search engine performance, five rounds of data were collected (from date: 10.07.2021 to 18.07.2021) from University Libraries' websites every alternate day (The details about collected data is given in appendix-ANX-2A to 2E) to see the consistency of research data, and an average of five rounds data was analysed.

After analysis, the study found that in the majority of university libraries (7), search expressions with gap have more hits than search expressions without gap in all rounds, which is logically incorrect, and that only a few University libraries (Manipal Academy of Higher Education, Savitribai Phule Pune University and Jamia Millia Islamia) have more hits in search expressions without gap in some of the rounds, which is logically correct.

Link Explorer, an online tool, was used to acquire the data for the Figure 1. Link Explorer is a new set of link analysis and competitive research tools that replaces Open Site Explorer and is powered by a brand new and robust live link index. It's a new version of Moz.com, Open Site Explorer that allows track the links that go to our website.

Domain authority and page authority of university's library websites

Domain Authority is a quality number produced by Moz that predicts how well a website will rank on search engines (on a 100-point scale). It uses a link metrics algorithm to estimate how well a root domain will rank in search engines. Page Authority is a Moz score (on a 100-point scale) that forecasts how well a certain page will rank in search engines. It uses a link metrics algorithm to estimate how well a page will rank in search engines. To analyze the domain authority and page authority of library websites of top 10 universities listed by NIRF during the year 2020, an online tool Link Explorer software (<https://moz.com/link-explorer>) has been used and two rounds' data was collected

Table 2: Presented that the average result of 10 University library search expressions with gap has more hits than search expressions without a gap in all rounds, which is logically incorrect.

Sl. No.	Search Expression (Without gap)	No. of Hits	Search Expression (with gap)	No. of Hits
1	site: www.iisc.ac.in/jrd-tata-memorial-library/	1	site: www.iisc.ac.in/jrd-tata-memorial-library/	18,340
2	site: lib.jnu.ac.in/	400.8	site: lib.jnu.ac.in/	7,95,000
3	site: www.bhu.ac.in/lib/	130.8	site: www.bhu.ac.in/lib/	41,94,000
4	site: www.amrita.edu/department/library/	10	site: www.amrita.edu/department/library/	7,12,600
5	site: 122.15.82.40:9900/	20	site: 122.15.82.40:9900/	5,338
6	site: igmlnet.uohyd.ac.in:8000/	4,860	site: igmlnet.uohyd.ac.in:8000/	11,640
7	site: www.culibrary.ac.in/	348.6	site: www.culibrary.ac.in/	22,560
8	site: manipal.edu/mu/campus-life/around-campus-facilities/libraries.html/	1	site: manipal.edu/mu/campus-life/around-campus-facilities/libraries.html/	27,460
9	site: lib.unipune.ac.in:8002/	77.2	site: lib.unipune.ac.in:8002/	8,666
10	site: jmi.ac.in/zhlibrary/	1	site: jmi.ac.in/zhlibrary/	12,900

Table 3: Average of University’s library websites with link command link: URL and link: URL Data collected by using “Link Explorer”.

Sl. No.	Search Expression (Without gap)	No. of Hits	Search Expression (With gap)	No. of Hits
1.	lihttp://www.iisc.ac.in/jrd-tata-.iisc.ac.in/jrd-tata-memorial-library/	2,342	link: www.iisc.ac.in/jrd-tata-memorial-library/	3,420
2.	link: lib.jnu.ac.in/	4,25,600	link: lib.jnu.ac.in/	8,20,600
3.	lihttp://www.bhu.ac.in/lib/c.in/lib/	3,96,400	link: www.bhu.ac.in/lib/	7,49,800
4.	link: www.amrita.edu/departm ent/library/	4,16,600	link: www.amrita.edu/department/library/	439,200
5.	link: 122.15.82.40:9900/	7.2	link: 122.15.82.40:9900/	5,330
6.	link: igmlnet.uohyd.ac.in:8000	10,660	link: igmlnet.uohyd.ac.in:8000/	10,880
7.	lihttp://www.culibrary.ac.in/.culibrary.ac.in/	8,388	link: www.culibrary.ac.in/	14,100
8.	link: manipal.edu/mu/campus- life/around-campus/campus- facilities/libraries.html/	27,800	link: manipal.edu/mu/campus- life/around-campus/campus- facilities/libraries.html/	26,020
9.	link: lib.unipune.ac.in:8002/	76,860	link: lib.unipune.ac.in:8002/	66,900
10.	link: jmi.ac.in/zhlibrary/	33,380	link: jmi.ac.in/zhlibrary/	33,300

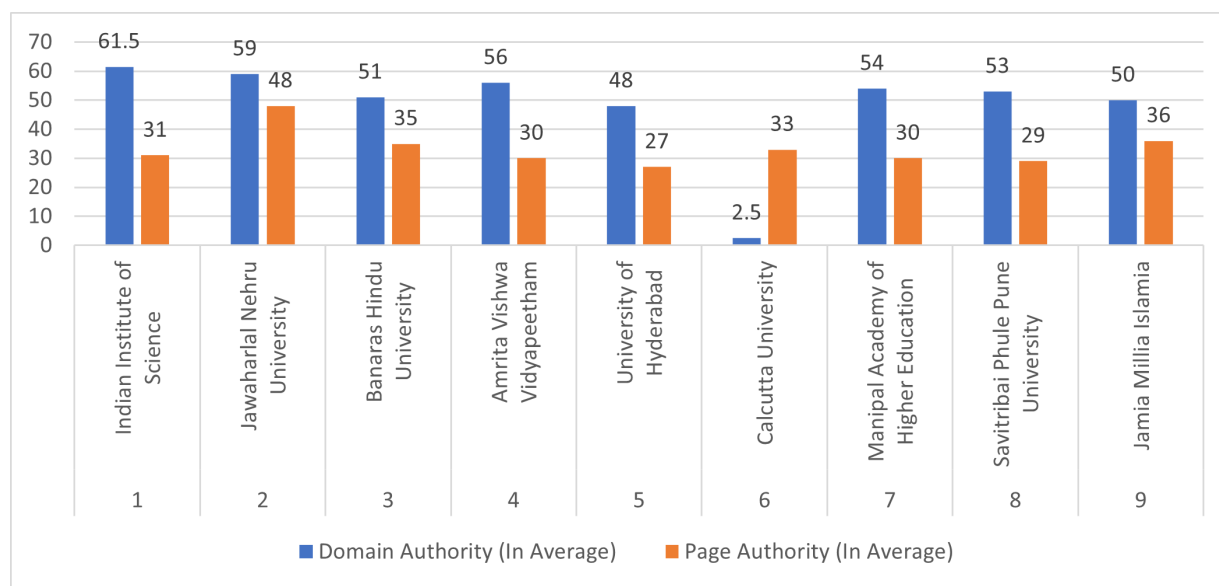


Figure 1: Domain authority and page authority.

(from date: 25.04.2021 to 25.05.2021) with one month interval to see the consistency of research data. The details about collected data is given in appendix-ANX-3A to 3B.

Domain Authority is a score that represents the strength of a domain name (on a scale of 100). If a website has a high domain authority, it has a good chance of ranking well in search results. The study observed that the average value Indian Institute of Science (IISc) secured 1st place with 61.5, which is followed by Jawaharlal Nehru University (JNU) with 59 at second place and Amrita Vishwa Vidyapeetham with 56 at third place. Calcutta University Library had the lowest score of 2.5.

On the other hand, the predictive ranking strength of a single page is measured by Page Authority. It means that the higher the page's score (on a scale of 100), the more likely it is to rank well in a search engine. The study further observed that Jawaharlal Nehru University secured first place with an average value of 48. The second and third place was occupied by Jamia Millia Islamia and Banaras Hindu University with an average value of 36 and 35 respectively. The lowest was attained by University of Hyderabad with an average value of 27.

The domain and page authority of the library websites of top 10 universities listed by NIRF during the year 2020, undertaken for the study in which library website of Jadavpur University is

Table 4: Internal followed links, external followed links and total links.

Sl. No.	Universities	Internal Followed Links (In Average)	External Followed Links (In Average)	Total Links (In Average)
1.	Indian Institute of Science.	1027.5	0	1029.5
2.	Jawaharlal Nehru University.	12564	7802.5	20399.5
3.	Banaras Hindu University.	167	19	191
4.	Amrita Vishwa Vidyapeetham.	5	0	5
5.	University of Hyderabad.	0	0	0
6.	Calcutta University.	1	4278.5	4296.5
7.	Manipal Academy of Higher Education.	581.5	0	581.5
8.	Savitribai Phule Pune University.	0	0	0
9.	Jamia Millia Islamia.	2759	6	2776

not working at the time of data collection. The domain and page authority of majority of the library websites are not so high in value which directly indicates low rank on search engine.

Internal followed links, external followed links and total links

To analyze internal followed links, external followed links and total links an online tool Link Explorer software (<https://moz.com/link-explorer>) has been used and two rounds' data was collected (from date: 25.04.2021 to 25.05.2021) with one month interval to see the consistency of research data. The details about the collected data are provided in Table 4 and further elaborated in the appendix - ANX-4A to 4B.

Internal followed links are hyperlinks on a webpage that lead to another webpage resource on the same website or domain. Internal links are also known as navigational links, self-links, or links inside links. The study observed that the library website of Jawaharlal Nehru University has the most internal followed links, with an average value of 12564, followed by Jamia Millia Islamia with an average value of 2759, and Indian Institute of Science with 1027.5. Calcutta University came in last with an average value of 1, which indicates of having less internal hyperlinks due to poor visibility. It is also noted that the library website of University of Hyderabad and Savitribai Phule Pune University have got zero internal followed links.

External followed links are hyperlinks that point to a domain other than the source's domain. It's also known as out link because it's a link that pointing out from a website. The study also observed that the library website of Jawaharlal Nehru University had the highest average value of 7802.5, followed by Calcutta University (4278.5), Banaras Hindu University (19), and Jamia Millia Islamia (6). It is also noted that the library website of Indian Institute of Science, Amrita Vishwa Vidyapeetham, University of Hyderabad, Manipal Academy of Higher Education and Savitribai Phule Pune University have got zero external followed links.

Total links are the total amount of links to a site. This includes all forms of links (internal, external, followed links). After reviewing the data, it was observed that library website of Jawaharlal Nehru University has the most total links, with an average of 20399.5, followed by Calcutta University with 4296.5 averages and Jamia Millia Islamia with a 2776 average. The lowest was obtained by Amrita Vishwa Vidyapeetham with 5 Average. It is also noted that the library website of University of Hyderabad and Savitribai Phule Pune University have got zero total links.

The Internal followed links, External followed links and Total links of the library websites undertaken for the study in which library Website of Jadavpur University is not working at the time of data collection.

Value of spam score of university libraries' websites

The spam score indicates the percentage of sites with identical attributes that Google has penalised or blacklisted. The spam score is calculated using machine learning model that recognised 27 common features (mentioned in the appendix-ANX-5) among millions of blacklisted or penalised websites in the data. The percentages of such scores are as follows: 1-30% represents low, 31-60% represents medium, and 61-100% represents high. The spam score will assist site developers and librarians in identifying possibly broken links. As a result, the website must be improved to decrease the risk of being penalized by Google. The raw data was collected in two rounds (from 25.04.2021 to 25.05.2021) to examine the spam score of the library websites of top 10 universities listed by NIRF during the year 2020, by using Link Explorer, an internet tool with a one- month interval to see the consistency of research data. The details about two round collected data is given in appendix - ANX-5A to 5B.

Figure 2 shows the average value of spam score of library websites of top 10 universities listed by NIRF during the year 2020. It is observed that all top 10 library websites of the universities listed

Table 5: Top five pages on the websites of university libraries.

Sl. No.	Universities	URL
1	Indian Institute of Science.	http://www.iisc.ac.in/
		http://iisc.ac.in/
		http://www.iisc.ac.in/admissions/
		http://jam.iisc.ac.in/
		http://www.cense.iisc.ac.in/
2	Jawaharlal Nehru University.	http://lib.jnu.ac.in/
		http://lib.jnu.ac.in/Online_Databases
		http://lib.jnu.ac.in/online_journals
		http://lib.jnu.ac.in/node/83/track
		http://lib.jnu.ac.in/e-newspapers
3	Banaras Hindu University.	http://www.bhu.ac.in/
		http://bhu.ac.in/
		http://www.bhu.ac.in/rac/
		http://www.bhu.ac.in/rac/geninst.php
		http://www.bhu.ac.in/history1.htm
4	Amrita Vishwa Vidyapeetham	http://www.amrita.edu/
		http://www.amrita.edu/sites/default/files/neuron-black-and-white-hi.png
		http://amrita.edu/
		http://www.amrita.edu/publication?page=132&f=&s=title&o=desc
		http://vlab.amrita.edu/
5	University of Hyderabad.	http://igmlnet.uohyd.ac.in/
		http://igmlnet.uohyd.ac.in/Entrance%20Question%20Papers%20-%202016/M.Phil%20-%20Comparative%20Literature%20-%202016.pdf
		http://igmlnet.uohyd.ac.in/Entrance%20Question%20Papers%20-%202013/M..A%20-%20Urdu%20-%202013.pdf
		http://igmlnet.uohyd.ac.in/Entrance%20Question%20Papers%20-%202010/M.Sc%20-%20Mathematics%20-%202010.pdf
		http://igmlnet.uohyd.ac.in/Entrance%20Question%20Papers%20-%202017/Ph.D%20-%20Sanskrit%20Studies%20-%202017.pdf
		http://igmlnet.uohyd.ac.in/Entrance%20Question%20Papers%20-%202017/Ph.D%20-%20Sanskrit%20Studies%20-%202017.pdf

Sl. No.	Universities	URL
6	Calcutta University.	http://www.culibrary.ac.in/
		http://culibrary.ac.in/
		http://www.culibrary.ac.in/doc/dg-lib-vc-intro.pdf
		http://www.culibrary.ac.in/ug-schedule-2021/files/IMG_0011.pdf
		http://www.culibrary.ac.in/ug-schedule-2021/files/IMG_0009.pdf
7	Manipal Academy of Higher Education.	http://www.manipal.edu/
		http://manipal.edu/mu.html
		http://manipal.edu/
		http://manipal.edu/mit.html
		http://jaipur.manipal.edu/
8	Savitribai Phule Pune University.	http://lib.unipune.ac.in/
		http://lib.unipune.ac.in/Portal/open%20archives%20India.htm
		http://lib.unipune.ac.in/MemRegHelp.pdf
		http://lib.unipune.ac.in/icep2013
		http://lib.unipune.ac.in/Institutional%20membership.pdf
9	Jamia Millia Islamia.	http://www.jmi.ac.in/
		http://jmi.ac.in/
		http://jmi.ac.in/islamicstudies
		http://jmi.ac.in/upload/menuupload/JobForm.pdf
		http://jmi.ac.in/bulletinboard/advertisement/latest/2

by NIRF during the year 2020 comes under the category 1-30% indicating low spam.

It is very clear from the Table 5 that none of the University library websites are in medium risk or in high risk which is very good. It also observed that the library websites of Banaras Hindu University, Amrita Vishwa Vidyapeetham and Jamia Millia Islamia have minimum spam score i.e., 1%.

The Spam score of the library websites undertaken for the study in which library website of Jadavpur University is not working at the time of data collection.

Total numbers of just-discovered linking domains

A discovered linking domain is one that has been discovered with a link to a specific site. It maintains track of the most recent visits to a particular site. To analyze the total discovered linking domains of library websites of top 10 universities listed by NIRF during the year 2020, an online tool Link Explorer software (<https://moz.com/link-explorer>) has been used and two rounds' data was collected (from date: 25.04.2021 to 25.05.2021) with one month interval to see the consistency of research data. The details about collected data is given in appendix-ANX-6A to 6B.

Figure 3 shows the average value of the total discovered linking domains of library websites of top 10 universities listed by NIRF during the year 2020. In this study library Website of Jadavpur University is not working at the time of data collection. After analysing the data from both rounds, the study showed that the average value of the library website of Jawaharlal Nehru University has highest newly discovered linking domains (143.5), followed by Calcutta University (120.5) and Jamia Millia Islamia (9). The lowest was attained by library website of Indian Institute of Science with only 2 discovered links. It is noted that the library websites of Amrita Vishwa Vidyapeetham, University of Hyderabad, Manipal Academy of Higher Education and Savitribai Phule Pune University have got zero total discovered linking domains.

Linking domains, followed linking domains and inbound Links analysis

The number of unique root domains pointing to a target is referred to as linking domains. Only one linking root domain will be counted for two links from the same website. The number of domains with at least one follow link to any page on the root domain is known as the number of followed linking domains. The incoming link from another website's page to your own site is known as an inbound link. Two or more links from the same website page are counted as a single link. Backlinks are also known as inbound links. It's a link on a third-party webpage that leads to a page on your own website.

To analysis the linking domains, followed linking domains and inbound links of library websites of top 10 universities listed by NIRF during the year 2020, an online tool Link Explorer software (<https://moz.com/link-explorer>) has been used and two rounds' data was collected (from date: 25.04.2021 to 25.05.2021) with one month interval to see the consistency of research data. The details about collected data is given in appendix-ANX-7A to 7B.

Table 6 shows the linking domains, followed linking domains and total inbound links of library websites of top 10 universities listed by NIRF during the year 2020. According to the data, the library Website of Jawaharlal Nehru University has the most linking domains with an average of 586.5, followed by Calcutta University with 150 and Savitribai Phule Pune University with 34.5. With an average of 2, the Indian Institute of Science's library website received the lowest rank. It is noted that the library websites of Amrita Vishwa Vidyapeetham and Manipal Academy of Higher Education have got zero linking domains.

The study discovered that the library Website of Jawaharlal Nehru University has the most followed linking domains, with an

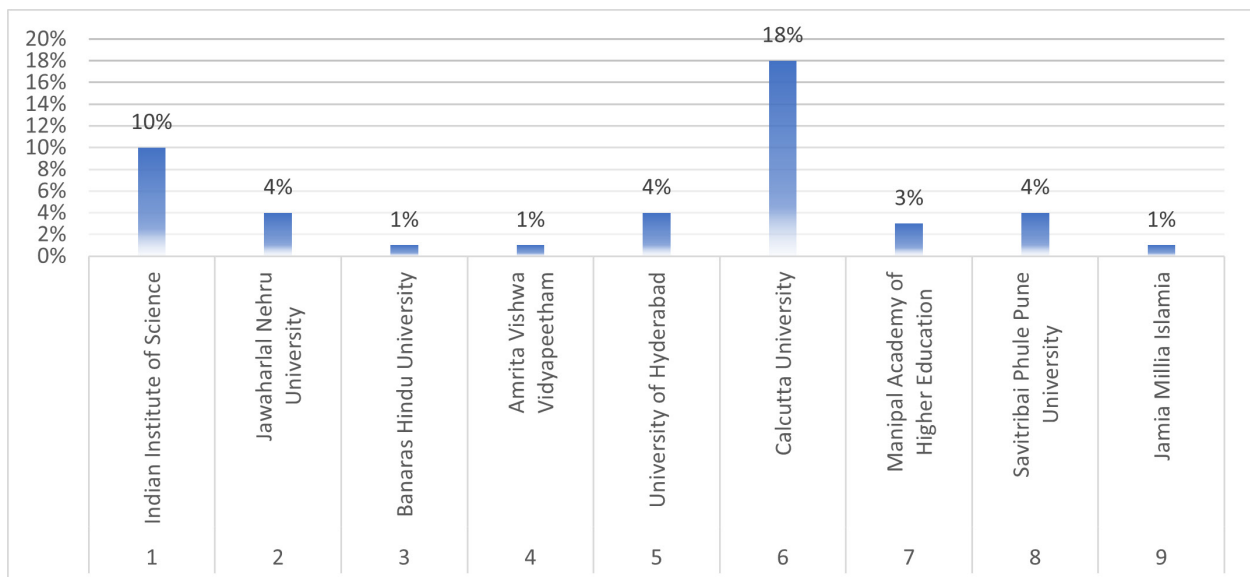


Figure 2: Spam score of University libraries' websites.

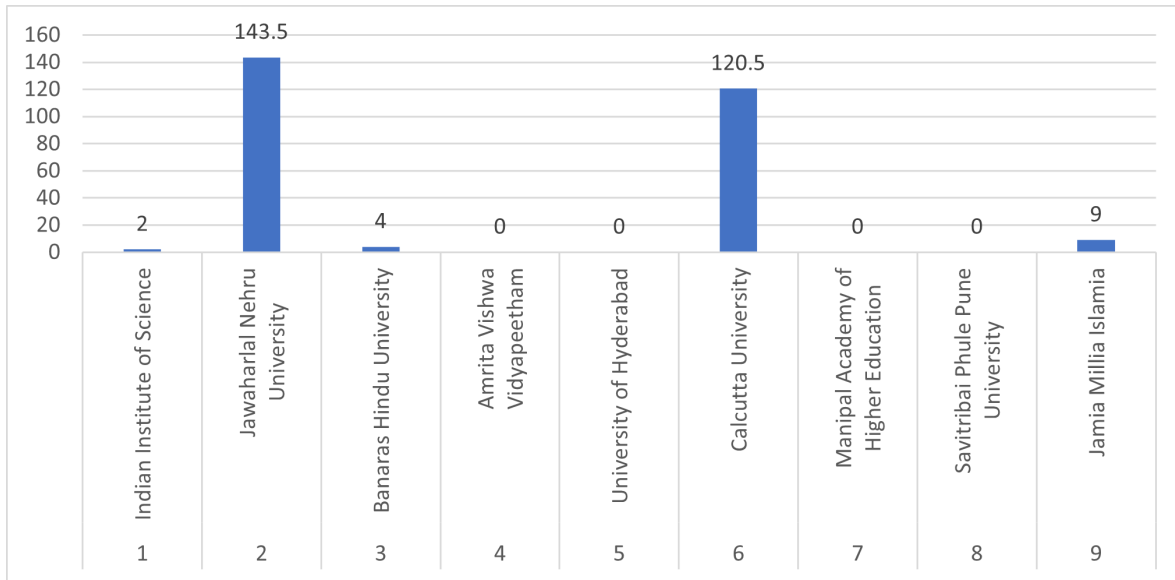


Figure 3: Just-discovered linking domains of University libraries’ website.

Table 6: Linking domains, followed by linking domains and total inbound Links.

Sl. No.	Universities	Linking Domains (In Average)	Followed Linking Domains (In Average)	Total Inbound Links (In Average)
1.	Indian Institute of Science.	2	0	2
2.	Jawaharlal Nehru University.	586.5	353	77850
3.	Banaras Hindu University.	4	2	24
4.	Amrita Vishwa Vidyapeetham.	0	0	0
5.	University of Hyderabad.	5	3	3600
6.	Calcutta University.	150	114	4900
7.	Manipal Academy of Higher Education.	0	0	0
8.	Savitribai Phule Pune University.	34.5	28.5	134.5
9.	Jamia Millia Islamia.	9	4	17

Table 7: Web impact factor of university libraries’ websites.

Sl. No.	Universities	IWIF	EWIF	SWIF
1.	Indian Institute of Science.	1027.5	0	1029.5
2.	Jawaharlal Nehru University.	147.81	91.79	239.99
3.	Banaras Hindu University.	1.09	0.12	1.25
4.	Amrita Vishwa Vidyapeetham.	0.5	0	0.5
5.	University of Hyderabad.	0	0	0
6.	Calcutta University.	0.002	10.59	10.63
7.	Manipal Academy of Higher Education.	581.5	0	581.5
8.	Savitribai Phule Pune University.	0	0	0
9.	Jamia Millia Islamia.	2759	6	2776

Table 8: Ranking of University libraries' websites based on Web impact factor.

Sl. No.	Universities	Ranking based on WIF
1.	Jamia Millia Islamia.	1
2.	Indian Institute of Science.	2
3.	Manipal Academy of Higher Education.	3
4.	Jawaharlal Nehru University.	4
5.	Calcutta University.	5
6.	Banaras Hindu University.	6
7.	Amrita Vishwa Vidyapeetham.	7
8.	University of Hyderabad.	8
9.	Savitribai Phule Pune University.	9

average of 353, followed by Calcutta University with an average of 114, and Savitribai Phule Pune University with 28.5. With an average of 2, the library website of Banaras Hindu University ranked the lowest. It is further observed that the library websites of Indian Institute of Science, Amrita Vishwa Vidyapeetham and Manipal Academy of Higher Education have zero followed linking domains.

While, the library website of Jawaharlal Nehru University has the highest average value of inbound links (77850), followed by Calcutta University (4900) and University of Hyderabad (3600). With an average of 2, the library website of the Indian Institute of Science was the lowest. It is also noted that the library websites of Amrita Vishwa Vidyapeetham and Manipal Academy of Higher Education have got zero total inbound links.

Top pages on the websites of university libraries

Table 6 gives the top five web pages on the library websites of top 10 universities listed by NIRF during the year 2020. It examines the site's most valuable pages in terms of key metrics, which reflect the important performance of certain web pages and their value in terms of performance. Although many clients visit the website, there are a few top pages that are more likely to be visited by users, giving the website developer/library professionals top priority pages. To analyze the top pages on the library websites of top

10 universities listed by NIRF during the year 2020, an online tool Link Explorer software (<https://moz.com/link-explorer>) has been used and two rounds' data was collected (from date: 25.04.2021 to 25.05.2021) with one month interval to see the consistency of research data. In this study library Website of Jadavpur University is not working at the time of data collection.

Web impact factor of university libraries' websites

Table 7 exhibits the Web Impact Factor of library websites of top 10 universities listed by NIRF during the year 2020. Three criteria, Internal Web Impact Factor (IWIF), External Web Impact Factor (EWIF), and Simple Web Impact Factor (SWIF), have been examined in this table.

The WIF is calculated by dividing the number of webpage's on a website that receive links from other websites by the number of webpage's published on the site that are accessible to the crawler. The WIF provides quantitative tools for ranking, evaluating, categorizing, and comparing websites, top-level domains and subdomains. The formulae for calculating the Web Impact Factor (WIF) are given below:

Distribution of Data by SWIF

Simple Web Impact Factor has been calculated by the following form:

$$\text{SWIF} = \frac{\text{Total No. of links}}{\text{Total No. of Webpage's}}$$

Total No. of Webpage's

Distribution of Data by IWIF

Internal Web Impact Factor has been calculated by the following formulae:

$$\text{IWIF} = \frac{\text{Total No. of Internal links}}{\text{Total No. of Webpage's}}$$

Total No. of Webpage's

Distribution of Data by EWIF

External Web Impact Factor has been calculated by the following formulae:

$$\text{EWIF} = \frac{\text{Total No. of External links}}{\text{Total No. of Webpage's}}$$

Total No. of Webpage's

The ratio of internal links within a site to the number of pages is known as the Internal Web Impact Factor (IWIF). According to the study, the library website of Jamia Millia.

Islamia ranked in first with the highest Internal WIF of 2759, followed by Indian Institute of Science with 1027.5 IWIF and Manipal Academy of Higher Education with 581.5 IWIF. The lowest Internal WIF was obtained by library Website of Calcutta University with 0.002 IWIF. It is noted that the library website of University of Hyderabad and Savitribai Phule Pune University has got zero IWIF.

The ratio of links from external sites to the target site to the number of pages on the site is known as the External Web Impact

Factor (EWIF). According to the study, the Library Website of Jawaharlal Nehru University has the highest External WIF of 91.79, followed by Calcutta University with 10.59 and Jamia Millia Islamia with 6. The lowest External WIF was obtained by Library Website of Banaras Hindu University with 0.12 EWIF. It is also to be noted that the library websites of Indian Institute of Science, Amrita Vishwa Vidyapeetham, University of Hyderabad, Manipal Academy of Higher Education and Savitribai Phule Pune University have got zero EWIF which shows poor status.

The ratio of links to the number of pages is known as the Simple Web Impact Factor (SWIF). The study also found that Library Website of Jamia Millia Islamia ranked first with 2776SWIF, followed by Indian Institute of Science with 1029.5 SWIF and Manipal Academy of Higher Education with 581.5 SWIF. The lowest Simple WIF was obtained by Library Website of Amrita Vishwa Vidyapeetham with 0.5 SWIF. It is further observed that the library website of University of Hyderabad and Savitribai Phule Pune University has got zero SWIF.

In this study Library Website of Jadavpur University is not working at the time of data collection. Hence only nine University library websites are undertaken for the study.

Thus, it is very important to maintain the status of the respective website. A website with insufficient visibility will always perform poorly. According to the study, the Web Impact Factor of the library websites of the top 10 universities listed by NIRF for the year 2020 is not up to the mark. It also observed that the External WIF of most of the websites were not in a good position and needs to improve a lot. It is suggested to recover the drawbacks of respective websites for its better accessibility and visibility. The link structure of respective libraries websites should be taken care for its best web presence and to fulfill the usage of the website by the users at a great extent.

Ranking of university libraries' websites based on web impact factor

Table 8 shows the ranking of library websites of top 10 universities listed by NIRF during the year 2020, based on their Web Impact Factor. The table clearly shows that the Library Website of Jamia Millia Islamia obtained 1st rank among the 9 websites. The 2nd and 3rd rank was secured by Indian Institute of Science and Manipal Academy of Higher Education respectively. While the other library websites of Jawaharlal Nehru University, Calcutta University, Banaras Hindu University, Amrita Vishwa Vidyapeetham, University of Hyderabad and Savitribai Phule Pune University occupied 4th, 5th, 6th, 7th, 8th, and 9th rank. In the previous study, Brahma and Verma, (2019) have also studied a webometric analysis of selected top Universities of India ranked by NIRF in 2017, they found that Jamia Millia Islamia, Indian Institute of Science, Manipal Academy of Higher Education, Jawaharlal Nehru University, Calcutta University, Banaras

Hindu University, Amrita Vishwa Vidyapeetham, University of Hyderabad and Savitribai Phule Pune University occupied 2nd, 5th, 19th, 4th, 11th, 7th, 8th, 21st and 22nd rank respectively.

The Library Website of Amrita Vishwa Vidyapeetham was ranked last, at number seven, followed by the University of Hyderabad at number eight, and Savitribai Phule Pune University at number nine. It is suggested that these countries need to focus on the enhancement of their website visibility.

FINDINGS

The study began with the goal of analysing and evaluating the websites of the University library, and the study's objectives were created accordingly. The following findings are drawn from the data analysis and inferences of the study:

On the basis of the commands site: URL and site: URL (without and with gap), the average result of 100% of the University libraries' search expressions with gap has more hits in all rounds than search expressions without a gap, which is logically incorrect. On the basis of command link: URL and link: URL (With gap and without gap), the average value of 70% of the University libraries' search expression with gap is having a greater number of hits in comparison to search expression without gap in all the rounds and very few University libraries (Manipal Academy of Higher Education, Savitribai Phule Pune University and Jamia Millia Islamia) have a greater number of hits in search expression without gap in some of the rounds.

According to Domain Authority, the average value of the Indian Institute of Science Library website came in first with 61.5, followed by Jawaharlal Nehru University in second place with 59 and Amrita Vishwa Vidyapeetham in third place with 56. Calcutta University had the lowest score of 2.5. Based on Page Authority, the average value of Library website of Jawaharlal Nehru University was the highest with 48, followed by Jamia Millia Islamia and Banaras Hindu University with an average value of 36 and 35 respectively. With an average value of 27, the library website of the University of Hyderabad came in last.

With an average value of 12564, the Library Website of Jawaharlal Nehru University has the most internal followed links, followed by Jamia Millia Islamia with 2759 and Indian Institute of Science with 1027.5. It is noted that the library website of University of Hyderabad and Savitribai Phule Pune University have got zero internal followed links. In terms of external followed links, Jawaharlal Nehru University's library website had the greatest average score (7802.5), followed by Calcutta University (4278.5), and Banaras Hindu University (19). With a score of 6, the library website of Jamia Millia Islamia received the lowest average. It is also noted that the library website of Institute of Science, Amrita Vishwa Vidyapeetham, University of Hyderabad, Manipal Academy of Higher Education and Savitribai Phule Pune University have got zero external followed links.

Jawaharlal Nehru University had the maximum total links, with an average of 20399.5, followed by Calcutta University with 4296.5 and Jamia Millia Islamia with 2776. The lowest average value was achieved by the library website of Amrita Vishwa Vidyapeetham. It is also noted that the library website of University of Hyderabad and Savitribai Phule Pune University have got zero external followed links.

Calcutta University has got maximum spam score i.e., 18% followed by Library website of Indian Institute of Science with 10%. It is further observed that all of the University libraries are under the category 1-30% indicating low spam score and safe for the website.

The average value of Library website of Jawaharlal Nehru University has the maximum number of newly discovered linking domains i.e., 143.5, followed by Calcutta University with 120.5 and Jamia Millia Islamia with 9 newly discovered links. The lowest was attained by Library website of Indian Institute of Science with only 2 discovered links. It is also noted that the library website of Amrita Vishwa Vidyapeetham, University of Hyderabad, Manipal Academy of Higher Education and Savitribai Phule Pune University have got zero newly discovered linking domains.

Jawaharlal Nehru University secured first place with maximum linking domains with an average of 586.5, followed by Calcutta University with 150 average and Savitribai Phule Pune University with an average of 34.5 and the lowest was obtained by the library website of Indian Institute of Science with an average of 2. It is noted that the library website of Amrita Vishwa Vidyapeetham and Manipal Academy of Higher Education have got zero linking domains. On the basis of followed linking domains, the library Website of Jawaharlal Nehru University obtained maximum followed linking domains with an average of 353, followed by Calcutta University with an average of 114 and Savitribai Phule Pune University with 28.5. The lowest was occupied by the library website of Banaras Hindu University with an average of 2, whereas Indian Institute of Science, Amrita Vishwa Vidyapeetham and Manipal Academy of Higher Education have got zero followed linking domains. While, the highest average value of inbound links was occupied by library Website of Jawaharlal Nehru University with 77850, followed by Calcutta University with 4900 and University of Hyderabad with 3600. The lowest was occupied by Indian Institute of Science with an average of 2. It is also noted that the library website of Amrita Vishwa Vidyapeetham and Manipal Academy of Higher Education have got zero inbound links. The library website of Jamia Millia Islamia obtained first place with the highest Internal WIF of 2759, Indian Institute of Science obtained second place with 1027.5 IWIF, and Manipal Academy of Higher Education obtained third place with 581.5 IWIF. The lowest Internal WIF was obtained by Library Website of Calcutta University with 0.002 IWIF and thus needs to be improved. It is also to be noted that the library website of

University of Hyderabad and Savitribai Phule Pune University have got zero IWIF which shows poor status.

The library website of Jawaharlal Nehru University scored the highest External WIF with 91.79, followed by Calcutta University with 10.59 and Jamia Millia Islamia with 6. The lowest External WIF was obtained by Library Website of Banaras Hindu University with 0.12 EWIF. It is also to be noted that the library website of Indian Institute of Science, Amrita Vishwa Vidyapeetham, University of Hyderabad, Manipal Academy of Higher Education and Savitribai Phule Pune University have got zero EWIF which shows poor status.

The Simple WIF of Jamia Millia Islamia's Library website came in first with 2776 SWIF, followed by Indian Institute of Science with 1029.5 SWIF and Manipal Academy of Higher Education with 581.5 SWIF. The lowest Simple WIF was obtained by Library website of Amrita Vishwa Vidyapeetham with 0.5 SWIF. It is also to be noted that the library website of University of Hyderabad and Savitribai Phule Pune University have got zero SWIF which shows poor status. The library website of Jamia Millia Islamia was ranked first among ten university libraries' websites based on their Web Impact Factor. Indian Institute of Science and Manipal Academy of Higher Education took second and third place, respectively. Other universities ranked 4th, 5th, 6th, 7th, 8th, and 9th were Jawaharlal Nehru University, Calcutta University, Banaras Hindu University, Amrita Vishwa Vidyapeetham, University of Hyderabad, and Savitribai Phule Pune University.

CONCLUSION

The goal of the research is to examine the library websites of top 10 universities listed by NIRF during the year 2020. For this, the researcher reviewed all 10 websites to ensure that they met the study's objectives. At the time of link analysis, the library Website of Jadavpur University is not working. Almost all library websites have a statement of responsibility that includes postal address, email address, and phone numbers, with hardly few have not given the fax numbers. Only a few have included the date of update on their university library websites, which is an important aspect of the website's visibility.

It's also been discovered that when searching with a gap in both the link and site command, the majority of university library websites return a higher number of results, however when searching without the gap, the number of results is much lower. Many university library websites need to improve their search engine performance. The domain and page authority scores are based on a 100-point scale, few of the University libraries are having a poor score. It is found that the page authority of the Library website of Jawaharlal Nehru University scored a good record.

For enhanced web visibility, the library website of Amrita Vishwa Vidyapeetham, University of Hyderabad, and Savitribai Phule

Pune University should focus on improving internal and external links. It is observed that none of the spam scores of university libraries' websites are at high risk, indicating that the website is working smoothly and should be maintained. The majority of universities libraries should aim to increase their links in terms of linking domains followed linking domains and total inbound links in order to improve their Web Impact Factor. The library website of Jamia Millia Islamia was ranked top on the overall Web impact factor, followed by Indian Institute of Science and Manipal Academy of Higher Education. On the other hand, the three University libraries with the lowest WIF were the University of Hyderabad, Savitribai Phule Pune University, and Amrita Vishwa Vidyapeetham. Because of poor results in various factors, the web impact factor was also affected, resulting in poor website efficiency and quality. As a result, it is the librarians'/ library professionals' responsibility to transform the library into a full-fledged information resource institution. In order to provide a large amount of information to the readers, the website builder must be knowledgeable enough to keep the website up to date with the latest technology.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

WEBSITES

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