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Websites of Top-Ranked Indian Higher Education Institutions: A Webometric Analysis

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Abstract

This paper explores a webometric study of the top25 institutions in India as ranked by the National Institutional Ranking Framework (NIRF), a nodal ranking agency of the Ministry of Human Resource Development (MHRD), Government of India. Efforts were made to establish a sort of ranking among these institutions' websites by applying various webometric indicators, the important ones being web impact factor, WISER index, Alexa traffic rank, search engine optimisation, the security rank of website, the number of social media followers, and external backlinks. Indian Institute of Technology, Indore, ranked first regarding web impact factor (WIF) (8.678343949), whereas Indian Institute of Technology, Roorkee ranked first regarding search engine optimisation. Eleven institutions' (44 percent) websites had very strong security ranks. Anna University, Chennai, ranked first in Alexa traffic rank, with a loading time of 0.693 seconds, and was followed by the University of Delhi, Delhi, and Indian Institute of Technology, Hyderabad. University of Delhi, Delhi, ranked first in the WISER index, with a value of 23.8984, and was followed by Bharathiar University, Coimbatore, and Jamia Millia Islamia, New Delhi.

Keywords: Webometric, Web Impact Factor (WIF), Alexa Ranking, WISER Value, NIRF, Search Engine Optimisation, Security Rank, Social Media Followers

Introduction

In this era of globalisation, which considerably affects higher education, institutions are highly concerned with their position in ranking lists prepared by various national and international agencies. Every year, lists of top-ranked Indian higher education institutions are published by different private agencies according to their own surveys. Since 2015, the National Institutional Ranking Framework (NIRF) has been publishing the list of the top 100 Indian higher education institutions based on broad parameters such as teaching, learning, and resources, research and professional practices, graduation outcomes, outreach and inclusivity, and perception. The Indian higher education system is one of the largest education systems in the world, and according to the All India Survey on Higher Education,

there are a total of 993 universities and 39931 colleges across the country, in which 3.73 crore students are obtaining various degrees under the supervision of 14.16 lakh teachers.

Owing to the competitive nature of higher education, it becomes an important task for any educational institution to attract the students. A website is an important tool for this purpose, as it helps to attract students and other stakeholders of higher education by disseminating the institution's portfolio on its portal. A well- and systematically designed website is a mirror of its respective academic institution; it must provide an interface for easy and effective communication. Attempts were made to analyse the websites of the top Indian universities/institutions with the help of webometric indicators. According to Thelwall and Vaughan (2004), webometrics is concerned with web phenomena and draws its methodology from bibliometrics. Bojorneborne and Ingwersen elaborate on the following main aspects of a webometric study:

- Web page content analysis
- Web link structure analysis
- Web usage analysis
- Web technology analysis.

Scenario of Indian higher education and NIRF: Brief note

In India, higher education is imparted in various disciplines, such as engineering and technology, medical sciences, pharmacy, social sciences, arts and humanities, through different types of institutions and universities, such as central universities, state universities, institutions of national importance, private universities, deemed universities, and open universities. The state of Indian higher education in 2018–19 is presented in Table 1. The figures in the table reflect that state public universities constituted a major share (37.36 percent) of Indian higher education, followed by state private universities (30.61 percent). It can also be seen that these together form nearly 68 percent of the Indian higher education system. The institutions of national importance constituted 12.78 percent, while the institutions under the State Legislature Act and central open universities contributed very little to the Indian higher education system.

Table 1: Scenario of Indian Higher Education: 2018-19

| Sr. No | Type of University / Institute | Number |
|---------------|---------------------------------------|---------------|
| 01 | Central University | 46 |
| 02 | Central Open University | 01 |
| 03 | Institution of National Importance | 127 |
| 04 | State Public University | 371 |

| | | |
|--------------|---|-----|
| 05 | Institution under State Legislature Act | 05 |
| 06 | State Open University | 14 |
| 07 | State Private University | 304 |
| 08 | State Private Open University | 01 |
| 09 | Deemed University – Government | 34 |
| 10 | Deemed University – Government Aided | 10 |
| 11 | Deemed University – Private | 80 |
| Total | | 993 |

Source: All India Survey on Higher Education
(<http://aishe.nic.in/aishe/viewDocument.action?documentId=262>)

NIRF

The Ministry of Human Resource Development (MHRD), Government of India, constituted the National Institutional Ranking Frame Work (NIRF) in 2015 for ranking Indian universities and institutions. Before 2015, there was no authorised national agency for this purpose. The NIRF prepares the list of the top 100 universities/institutions in general and in specific categories, such as the top hundred institutions in India, top engineering institutions, and top management institutions. The NIRF parameters for this ranking are broadly concerned with teaching, learning, and resources, research and professional practices, graduation outcomes, outreach and inclusivity, and perception.

Review of selected literature

Thelwall (2012) explained the concept of webometrics with its brief history and elaborated on the terms link analysis, network analysis, and citation analysis. **Dolai (2018)** carried out a webometric analysis of the thirteen government-aided universities in Kolkata with the help of the Google search engine. The parameters used for this study were WISER value, web impact factor (WIF), and the correlation between WIF and WISER. **Jeysankar and Nachiappan (2018)** studied the websites of the 41 CSIR institutions in India. The webometric indicators used for this study were self-link WIF, in-link WIF, external link WIF, and revised WIF. **Kutty (2018)** conducted a webometric analysis of 92 websites of ICAR organisations. The webometric indicators used for this study were WIF, absolute WIF, and others. **Ramanayaka, Chen, and Shi (2018)** carried out a webometric study of the 15 university library websites in Sri Lanka. The assessment tools they used were WIF,

WISER value, rich files, and external backlinks. **Rani and Pal (2018)** examined the websites of 16 health science universities in India, their parameters being Alexa rank, Google Page Rank, and rich files. **Gupta (2017)** carried out a webometric study of the websites of the national libraries in Asia with the help of WIF and WISER values. **Islam and Alam (2017)** explored the websites of 44 private universities in Bangladesh with the help of overall WIF, absolute WIF, self-link, and internal link. **Lalbiakmawia and Verma (2017)** studied the websites of the Indian Institute of Management by analysing domain classification, domain authority, WIF, and file formats supported. **Verma and Brahma (2017)** analysed the websites of ten central universities in North-East India. The study was based on domain authority, page authority, total internal links, total external links, internal equity passing link, external equity passing link, and total equity passing link. **Baka and Leyni (2015)** explored the websites of the top 30 and bottom 30 world-class universities using Alexa ranking and Eval Access. **Chakravarty and Wasan (2015)** analysed the library websites of the higher education institutions in India through Google search engine and WIF. **Gharibeniazi, Kamran, and Ghaebi (2015)** conducted a study on Iranian state universities with the help of web quality evaluation method (WebQEM) and web assessment index (WAI). **Maharana, Panda, and Sahoo (2014)** examined the websites of 16 Indian Institutes of Technology (IITs) with the help of Alexa ranking and WIF. **Ratha, Joshi, and Naidu (2012)** carried out a webometric study of the library websites of IITs with the help of WIF and link analysis. **Kothainayaki and Gopalkrishnan (2011)** carried out a webometric study of 54 agriculture universities in India using Google Page Rank, Alexa traffic rank, and rich files. **Babu, Jeyshankar, and Rao (2010)** examined the websites of 40 central universities in India by using parameters such as simple WIF, self-link WIF, external WIF, and revised WIF.

From these studies, it can be concluded that the majority of webometric studies were conducted with the help of link analysis and WIF, whereas some studies used WISER value and Alexa rank. Only one study, Ahmed and Nur, used Eval Access for assessing websites, and WebQEM and WAI were also only seen in the study carried out by Gharibeniazi, Kamran, and Ghaebi.

Objectives of the study

The objectives of this study are listed below:

1. To find out the domain classification and domain age of the top-ranked Indian higher education institutions' websites.
2. To know the WIF of the top-ranked Indian higher education institutions' websites.
3. To analyse the search engine optimisation (SEO) results for the top-ranked Indian higher education institutions' websites.
4. To calculate the website security rank of the top-ranked Indian higher education institutions' websites.
5. To know the external backlinks of the top-ranked Indian higher education institutions' websites.
6. To find out the Alexa rank of the top-ranked Indian higher education institutions' websites.

7. To know the number of social media followers of the top-ranked Indian higher education institutions' websites.
8. To ascertain the ranking of the top-ranked Indian higher education institutions' websites based on WISER values.

Scope and limitations

The present study is limited to the 25 websites of the top-ranked Indian higher education institutions for the year 2020 by NIRF.

Methodology and data collection

The Webimax portal is used as a tool for analysing the top-ranked Indian higher education institutions' websites. To find out the domain age of the concerned websites, the Dupli Checker portal was used.

The following eight Boolean search statement methods and the Google search engine were used to collect data from each university's website. The search commands and retrieved Google results are presented below:

| Search Command | Result |
|---|--|
| site:~abc | Total number of webpages |
| Site:~abc NOT link-domain:~abc | Total number of external links or in-links/R-WIF |
| Site:~abc AND link-domain:~abc | Total number of self-links |
| Site:~abc filetype:pdf | Total number of PDF files |
| Site:~abc filetype:doc | Total number of DOC files |
| Site:~abc filetype:ppt | Total number of PPT files |
| Site:~abc filetype:xls | Total number of XLS files |
| Site:~abc (search in Google Scholar) | Total number of pages in Google Scholar |

Note: (~) denote space among command

(WP=Web Page, WIF=Web Impact Factor, IL=In-link, SL=Self Link)

Statistical Tool for applying on data

$$R\text{-WIF (In-link-WIF)} = \frac{\text{In-link (external backlinks to the website)}}{\text{Number of web pages published on the website that are indexed by a search engine}}$$

- WISER formula =log (visibility 50%) +log (size 20%) + log (Rich file15%) +log (scholar15%)

Top 25 institutions and domain extension classification of the websites

Table 2 presents the data regarding the list of top 25 Indian higher education institutions as ranked by NIRF and the domain extension classification of the websites. It is clear from the table that out of top 10 Indian higher education institutions, seven were IITs, and out of the 25 top institutions, 10 were IITs. The state-wide analysis shows that 20 percent of the institutions were from Tamil Nadu, which was followed by Delhi (16 percent), Maharashtra (12 percent), and Bengal (12 percent). The institutions have three different types of domain extension: **.ac.in**, **.edu** and **.edu.in**. Twenty institutions (80 percent) had the domain extension **.ac.in**, while four (16 percent) had **edu.in** and one (4 percent) had **.edu.**, displaying a lack of uniformity in the domain extension.

Table 2: Domain extension classification

| Sr.No. | Name | URL |
|--------|--|---|
| 1 | Indian Institute of Technology, Chennai | https://www.iitm.ac.in |
| 2 | Indian Institute of Science, Bengaluru | https://www.iisc.ac.in |
| 3 | Indian Institute of Technology, New Delhi | https://home.iitd.ac.in |
| 4 | Indian Institute of Technology, Mumbai | http://www.iitb.ac.in |
| 5 | Indian Institute of Technology, Kharagpur | http://www.iitkgp.ac.in |
| 6 | Indian Institute of Technology, Kanpur | https://www.iitk.ac.in |
| 7 | Indian Institute of Technology, Guwahati | https://www.iitg.ac.in |
| 8 | Jawaharlal Nehru University, New Delhi | https://www.jnu.ac.in |
| 9 | Indian Institute of Technology, Roorkee | https://www.iitr.ac.in |
| 10 | Banaras Hindu University, Varanasi | https://www.bhu.ac.in |
| 11 | Calcutta University, Kolkata | https://www.caluniv.ac.in |
| 12 | Jadavpur University, Kolkata | http://www.jaduniv.edu.in |
| 13 | Amrita Vishwa Vidyapeetham, Coimbatore | https://www.amrita.edu |
| 14 | Manipal Academy of Higher Education, Manipal | https://manipal.edu |
| 15 | University of Hyderabad, Hyderabad | https://www.uohyd.ac.in |

| | | |
|----|--|---|
| 16 | Jamia Millia Islamia, New Delhi | https://www.jmi.ac.in |
| 17 | Indian Institute of Technology, Hyderabad | https://iith.ac.in |
| 18 | University of Delhi, Delhi | http://www.du.ac.in |
| 19 | Savitribai Phule Pune University, Pune | http://www.unipune.ac.in |
| 20 | Anna University, Chennai | https://www.annauniv.edu |
| 21 | Bharathiar University, Coimbatore | https://www.b-u.ac.in |
| 22 | Indian Institute of Technology (Indian School of Mines), Dhanbad | https://www.iitism.ac.in |
| 23 | Indian Institute of Technology, Indore | https://www.iiti.ac.in |
| 24 | National Institute of Technology, Tiruchirappalli | https://www.nitt.edu |
| 25 | Indian Institute of Science Education & Research, Pune | https://www.iiserpune.ac.in |

Domain registration age

Efforts were made to know the domain age of the institutions' websites. For calculating this, Dupli Checker was used. Table 3 ascertains the data about the domain registration age of the studied websites. It can be observed that Anna University, Chennai's website ranked first regarding the domain registration age, having completed 22 years since domain registration. Meanwhile, Amrita Vishwa Vidyapeetham, Coimbatore's website also had completed 22 years since domain registration and ranked second. The websites of Manipal Academy of Higher Education, Manipal, Calcutta University, Kolkata, and Jamia Millia Islamia, New Delhi, ranked third, fourth and fifth respectively. The majority of the institutions' (80 percent) domains had completed more than 10 years since registration. Furthermore, six institutions' domains had completed 16 years since registration.

Table 3: Domain age

| Age Rank | Name of Institution | Domain Created on | Completed | |
|----------|--|-------------------|-----------|--------|
| | | | Years | Months |
| 1 | Anna University, Chennai | 22/05/1998 | 22 | 5 |
| 2 | Amrita Vishwa Vidyapeetham, Coimbatore | 14/08/1998 | 22 | 2 |
| 3 | Manipal Academy of Higher Education, Manipal | 27/09/1999 | 21 | 1 |
| 4 | Calcutta University, Kolkata | 30/11/2002 | 17 | 11 |
| 5 | Jamia Millia Islamia, New Delhi | 21/12/2002 | 17 | 10 |
| 6 | Indian Institute of Technology Madras, Chennai | 28/02/2003 | 17 | 8 |

| | | | | |
|----|--|------------|----|---|
| 7 | Indian Institute of Technology Delhi, New Delhi | 28/02/2003 | 17 | 8 |
| 8 | Banaras Hindu University, Varanasi | 31/07/2003 | 17 | 3 |
| 9 | Indian Institute of Technology, Guwahati | 31/08/2003 | 17 | 2 |
| 10 | National Institute of Technology, Tiruchirappalli | 12/8/2003 | 17 | 2 |
| 11 | Bharathiar University, Coimbatore | 19/09/2003 | 17 | 1 |
| 12 | Indian Institute of Technology, Mumbai | 28/02/2004 | 16 | 8 |
| 13 | Indian Institute of Technology, Kharagpur | 23/02/2004 | 16 | 8 |
| 14 | Indian Institute of Technology, Kanpur | 28/02/2004 | 16 | 8 |
| 15 | Jawaharlal Nehru University, New Delhi | 28/02/2004 | 16 | 8 |
| 16 | University of Delhi, Delhi | 28/02/2004 | 16 | 8 |
| 17 | Indian Institute of Technology, Roorkee | 31/05/2004 | 16 | 5 |
| 18 | Indian Institute of Science Education & Research, Pune | 29/05/2006 | 14 | 5 |
| 19 | Indian Institute of Technology, Hyderabad | 8/8/2008 | 12 | 3 |
| 20 | Savitribai Phule Pune University, Pune | 23/01/2009 | 11 | 9 |
| 21 | Jadavpur University, Kolkata | 30/03/2010 | 10 | 7 |
| 22 | Indian Institute of Technology, Indore | 7/4/2010 | 10 | 7 |
| 23 | University of Hyderabad, Hyderabad | 2/6/2011 | 9 | 5 |
| 24 | Indian Institute of Science, Bengaluru | 5/8/2015 | 5 | 3 |
| 25 | Indian Institute of Technology (Indian School of Mines), Dhanbad | 6/9/2016 | 4 | 2 |

Web Impact Factor (WIF)

WIF is one of the important quantitative indicators of a webometric study. According to Ingwersen, WIF means the ratio of links made to a website to the number of pages on the website. The number of in-links (IL) is the most important factor in WIF calculation. The formula for calculating the WIF is given below:

$$\text{R-WIF (In-link-WIF)} = \frac{\text{In-link (External backlinks to the Website)}}{\text{Number of Web pages published on the website Which are indexed by a search engine}}$$

Table 4 ascertains the data about the WIFs of the websites studied. It can be observed that Indian Institute of Technology, Indore, ranked first regarding WIF (8.678343949) and was followed by the Manipal Academy of Higher Education, Manipal (0.857142857) and Indian Institute of Technology Bombay, Mumbai (0.743362832). Meanwhile, Banaras Hindu

University, Varanasi, Jawaharlal Nehru University, New Delhi, and Jamia Millia Islamia, New Delhi, was in the 23rd, 24th and 25th positions respectively. Out of the 25 top-ranked institutions, University of Delhi, Delhi, had highest number of in-links and was followed by Bharathiar University, Coimbatore, and Indian Institute of Technology, Indore. Indian Institute of Science Education and Research, Pune, Calcutta University, Kolkata, and Jadavpur University, Kolkata had the lowest number of in-links as compared to the other institutions studied.

Table 4: Web Impact Factor

| Sr. No | Name | Webpages | In -Link | Self-Link | In-link WIF/R-WIF | Rank |
|---------------|--|-----------------|-----------------|------------------|--------------------------|-------------|
| 1 | Indian Institute of Technology, Indore | 628000 | 5450000 | 6030000 | 8.678343949 | 1 |
| 2 | Manipal Academy of Higher Education, Manipal | 637000 | 546000 | 528000 | 0.857142857 | 2 |
| 3 | Indian Institute of Technology, Mumbai | 452000 | 336000 | 315000 | 0.743362832 | 3 |
| 4 | Bharathiar University, Coimbatore | 203000000 | 119000000 | 116000000 | 0.586206897 | 4 |
| 5 | Amrita Vishwa Vidyapeetham, Coimbatore | 1590000 | 858000 | 772000 | 0.539622642 | 5 |
| 6 | Calcutta University, Kolkata | 36700 | 19700 | 19700 | 0.536784741 | 6 |
| 7 | Indian Institute of Technology, Kharagpur | 282000 | 150000 | 198000 | 0.531914894 | 7 |
| 8 | Indian Institute of Technology, Hyderabad | 1880000 | 963000 | 1060000 | 0.512234043 | 8 |
| 9 | University of Delhi, Delhi | 1150000000 | 443000000 | 399000000 | 0.385217391 | 9 |
| 10 | Jadavpur University, Kolkata | 33400 | 12400 | 12600 | 0.371257485 | 10 |
| 11 | Anna University, Chennai | 128000 | 45400 | 44300 | 0.3546875 | 11 |
| 12 | University of Hyderabad, Hyderabad | 729000 | 182000 | 191000 | 0.249657064 | 12 |
| 13 | Indian Institute of Technology (Indian School of Mines), Dhanbad | 95900 | 23300 | 26200 | 0.242961418 | 13 |
| 14 | Indian Institute of Technology, Guwahati | 602000 | 119000 | 98400 | 0.197674419 | 14 |
| 15 | Savitribai Phule Pune University, Pune | 1260000 | 248000 | 325000 | 0.196825397 | 15 |

| | | | | | | |
|----|--|----------|--------|--------|-------------|----|
| 16 | Indian Institute of Science Education & Research, Pune | 112000 | 20600 | 25500 | 0.183928571 | 16 |
| 17 | National Institute of Technology, Tiruchirappalli | 612000 | 112000 | 104000 | 0.183006536 | 17 |
| 18 | Indian Institute of Technology, Delhi | 399000 | 66500 | 60500 | 0.166666667 | 18 |
| 19 | Indian Institute of Technology, Kanpur | 1450000 | 230000 | 286000 | 0.15862069 | 19 |
| 20 | Indian Institute of Technology, Chennai | 2400000 | 276000 | 292000 | 0.115 | 20 |
| 21 | Indian Institute of Science, Bengaluru | 2560000 | 271000 | 300000 | 0.105859375 | 21 |
| 22 | Indian Institute of Technology, Roorkee | 1440000 | 135000 | 176000 | 0.09375 | 22 |
| 23 | Banaras Hindu University, Varanasi | 8750000 | 504000 | 497000 | 0.0576 | 23 |
| 24 | Jawaharlal Nehru University, New Delhi | 7080000 | 372000 | 343000 | 0.052542373 | 24 |
| 25 | Jamia Millia Islamia, New Delhi | 20400000 | 889000 | 838000 | 0.043578431 | 25 |

Search engine optimisation (SEO)

Table 5 pertains to the data about the SEO ranks of the websites studied. SEO is useful for enhancing the popularity and visibility of websites. It also helps enhance the quality and quantity of website traffic from across the world. The figures in the table show that Indian Institute of Technology, Roorkee, ranked first regarding SEO and was followed by Amrita Vishwa Vidyapeetham, Coimbatore, and Indian Institute of Technology, Indore. Meanwhile, Anna University, Chennai, Indian Institute of Technology (Indian School of Mines), Dhanbad, and Indian Institute of Science, Education, and Research, Pune, ranked 23rd, 24th, and 25th respectively. It is clear from Table 5 that the majority of the institutions studied had very poor SEO results.

Table 5: Search Engine Optimization

| SEO Rank | Name of the Institution | SEO Result |
|----------|---|------------|
| 1 | Indian Institute of Technology, Roorkee | A+ |
| 2 | Amrita Vishwa Vidyapeetham, Coimbatore | A |
| 3 | Indian Institute of Technology, Indore | B |
| 4 | Jawaharlal Nehru University, New Delhi | B- |

| | | |
|----|--|----|
| 5 | Manipal Academy of Higher Education, Manipal | B- |
| 6 | National Institute of Technology, Tiruchirappalli | B- |
| 7 | Indian Institute of Technology, Bombay | C+ |
| 8 | Jamia Millia Islamia, New Delhi | C+ |
| 9 | Indian Institute of Technology, Chennai | C |
| 10 | Indian Institute of Technology, Delhi | C |
| 11 | Indian Institute of Technology, Kanpur | C |
| 12 | Indian Institute of Science, Bengaluru | C- |
| 13 | University of Hyderabad, Hyderabad | C- |
| 14 | Indian Institute of Technology, Hyderabad | C- |
| 15 | Bharathiar University, Coimbatore | D+ |
| 16 | Banaras Hindu University, Varanasi | D- |
| 17 | Jadavpur University, Kolkatta | D- |
| 18 | Indian Institute of Technology, Kharagpur | F |
| 19 | Indian Institute of Technology, Guwahati | F |
| 20 | Calcutta University, Kolkata | F |
| 21 | University of Delhi, Delhi | F |
| 22 | Savitribai Phule Pune University, Pune | F |
| 23 | Anna University, Chennai | F |
| 24 | Indian Institute of Technology (Indian School of Mines), Dhanbad | F |
| 25 | Indian Institute of Science Education & Research, Pune | F |

Website security rank

While creating, hosting, and maintaining a website, the security of the website is of utmost importance. Website security issues involve attack from hackers, website malware, and other online threats. Efforts were made to know the website security issues of the institutions covered under this study. The data about the website security rank of the websites studied is presented in Table 6. The results show that out of selected 25 institutions,

11 institutions' (44 percent) websites had very strong security, whereas five institutions' websites had average security, and two institutions' websites had poor security. The remaining seven institutions' websites had very poor security.

Table 6: Website security

| Security Rank | Name | Security Result |
|---------------|--|-----------------|
| 1 | Indian Institute of Technology, Roorkee | A+ |
| 2 | Amrita Vishwa Vidyapeetham, Coimbatore | A+ |
| 3 | Manipal Academy of Higher Education, Manipal | A+ |
| 4 | Jamia Millia Islamia, New Delhi | A+ |
| 5 | Indian Institute of Technology, Hyderabad | A+ |
| 6 | Indian Institute of Technology, Chennai | A+ |
| 7 | Indian Institute of Technology, Delhi | A+ |
| 8 | National Institute of Technology, Tiruchirappalli | A+ |
| 9 | Calcutta University, Kolkata | A+ |
| 10 | Indian Institute of Science, Bengaluru | A+ |
| 11 | Indian Institute of Technology (Indian School of Mines), Dhanbad | A+ |
| 12 | Bharathiar University, Coimbatore | C |
| 13 | Indian Institute of Technology, Indore | C |
| 14 | Jawaharlal Nehru University, New Delhi | C |
| 15 | University of Hyderabad, Hyderabad | C |
| 16 | Indian Institute of Science Education & Research, Pune | C |
| 17 | Indian Institute of Technology, Guwahati | D+ |
| 18 | Savitribai Phule Pune University, Pune | D+ |
| 19 | Indian Institute of Technology, Bombay | F |
| 20 | Indian Institute of Technology, Kharagpur | F |
| 21 | Anna University, Chennai | F |
| 22 | Indian Institute of Technology, Kanpur | F |
| 23 | Banaras Hindu University, Varanasi | F |
| 24 | Jadavpur University, Kolkata | F |
| 25 | University of Delhi, Delhi | F |

External backlinks

External backlink refers to other domains than the existing source. Table 7 presents the data about external backlinks. The figures in the table show that Indian Institute of Technology, Kanpur, ranked first with the highest number of external backlinks and was

followed by the Indian Institute of Technology ,Mumbai and Indian Institute of Technology, Kharagpur, with 3500000 and 3100000 external backlinks respectively. Meanwhile, Indian Institute of Technology (Indian School of Mines), Dhanbad, Indian Institute of Technology, Indore, and University of Delhi, Delhi, ranked 23rd, 24th and 25th, respectively.

Table 7: External backlinks

| Rank | Name | External Backlinks |
|-------------|--|---------------------------|
| 1 | Indian Institute of Technology, Kanpur | 9300000 |
| 2 | Indian Institute of Technology, Bombay | 3500000 |
| 3 | Indian Institute of Technology, Kharagpur | 3100000 |
| 4 | Indian Institute of Technology, Delhi | 1600000 |
| 5 | Indian Institute of Science, Bangalore | 1500000 |
| 6 | Anna University, Chennai | 1300000 |
| 7 | Indian Institute of Technology, Madras | 971300 |
| 8 | Amrita Vishwa Vidyapeetham, Coimbatore | 623700 |
| 9 | Calcutta University, Kolkata | 492400 |
| 10 | Indian Institute of Technology, Guwahati | 302500 |
| 11 | Savitribai Phule Pune University, Pune | 287800 |
| 12 | Jawaharlal Nehru University, New Delhi | 263200 |
| 13 | Indian Institute of Technology, Roorkee | 227800 |
| 14 | Indian Institute of Technology, Hyderabad | 202400 |
| 15 | Bharathiar University, Coimbatore | 171200 |
| 16 | National Institute of Technology, Tiruchirappalli | 143100 |
| 17 | Banaras Hindu University, Varanasi | 141900 |
| 18 | Jamia Millia Islamia, New Delhi | 97300 |
| 19 | Indian Institute of Science Education & Research, Pune | 75200 |
| 20 | Jadavpur University, Kolkata | 69900 |
| 21 | University of Hyderabad, Hyderabad | 41500 |
| 22 | Manipal Academy of Higher Education, Manipal | 31400 |
| 23 | Indian Institute of Technology (Indian School of Mines), Dhanbad | 21100 |
| 24 | Indian Institute of Technology, Indore | 17800 |
| 25 | University of Delhi, Delhi | 00008 |

Alexa traffic rank

The Alexa rank is calculated on the basis of proprietary methodology that combines a site's estimated traffic and visitor engagement over the past three months. Table 8 contains the data about the Alexa traffic rank of the websites studied. The results show that Anna University, Chennai, ranked first in Alexa traffic rank, with a loading time of 0.693 seconds, and was followed by the University of Delhi, Delhi, and Indian Institute of Technology, Hyderabad, with loading time 0.723 seconds and 0.764 seconds respectively. It can also be seen that Indian Institute of Technology (Indian School of Mines), Dhanbad, was in the last position regarding Alexa traffic rank. The institutions should improve the loading time of their websites to enhance their rank.

Table 8 : Alexa Traffic Rank

| Alexa Rank | Name | Alexa Traffic Rank | Alexa Traffic Rank in India | Load Time |
|-------------------|---|---------------------------|------------------------------------|------------------------------|
| 1 | Anna University, Chennai | 26445 | 2384 | Very Fast (0.693 Seconds) |
| 2 | University of Delhi, Delhi | 3730 | 293 | Very Fast (0.723 Seconds) |
| 3 | Indian Institute of Technology Hyderabad, Hyderabad | 80731 | 7059 | Very Fast (0.764 Seconds) |
| 4 | Indian Institute of Technology, Guwahati | 28595 | 3712 | Very Fast (0.863 Seconds) |
| 5 | Indian Institute of Technology, Indore | 157831 | 22550 | Very Fast (0.877 Seconds) |
| 6 | Savitribai Phule Pune University, Pune | 12615 | 866 | Very Fast (0.921 Seconds) |
| 7 | Jamia Millia Islamia, New Delhi | 40965 | 3549 | Very Fast (0.932 Seconds) |
| 8 | University of Hyderabad, Hyderabad | 66181 | 5731 | Very Fast |

| | | | | |
|-----------|---|-------|-------|------------------------------|
| | | | | (0.932 Seconds) |
| 9 | Indian Institute of Technology, Mumbai | 4144 | 417 | Very Fast (0.933 Seconds) |
| 10 | Indian Institute of Technology, Delhi | 12679 | 1261 | Fast (0.977 Seconds) |
| 11 | Manipal Academy of Higher Education, Manipal | 38856 | 5820 | Fast (0.988 Seconds) |
| 12 | Indian Institute of Technology, Kanpur | 9598 | 977 | Fast (1.03 Seconds) |
| 13 | Banaras Hindu University, Varanasi | 45780 | 4902 | Fast (1.032 Seconds) |
| 14 | Calcutta University, Kolkata | 90106 | 11420 | Fast (1.048 Seconds) |
| 15 | Indian Institute of Technology, Kharagpur | 14547 | 1522 | Fast (1.146 Seconds) |
| 16 | Indian Institute of Technology, Roorkee | 40375 | 4866 | Fast (1.147 Seconds) |
| 17 | Indian Institute of Technology, Chennai | 10433 | 658 | Fast (1.172 Seconds) |
| 18 | Amrita Vishwa Vidyapeetham, Coimbatore | 31192 | 3041 | Fast (1.318 Seconds) |
| 19 | National Institute of Technology Tiruchirappalli, Tiruchirappalli | 83631 | 11848 | Fast (1.323 Seconds) |
| 20 | Jadavpur University, Kolkata | 83088 | 13694 | Average (1.606 Seconds) |

| | | | | |
|----|--|--------|-------|----------------------------|
| 21 | Indian Institute of Science, Bengaluru | 28581 | 1821 | Average (1.775 Seconds) |
| 22 | Bharathiar University, Coimbatore | 86499 | 9725 | Average (1.833 Seconds) |
| 23 | Jawaharlal Nehru University, New Delhi | 45122 | 3772 | Average (1.911 Seconds) |
| 24 | Indian Institute of Science Education & Research, Pune | 172359 | 16265 | Slow (2.32 Seconds) |
| 25 | Indian Institute of Technology (Indian School of Mines), Dhanbad | 107407 | 20563 | Slow (2.763 Seconds) |

Social media followers

The websites provide the links to the social media accounts of their respective institutions. Attempts were made to know the social media followers of the selected institutions on Twitter and YouTube. The data regarding this is presented in Table 9. The figures in the table reflect that among the top 25 ranked institutions, Indian Institute of Technology Bombay, Mumbai, had the highest number of followers on Twitter, with 83889 followers, and was followed by the Indian Institute of Technology, Madras, and Indian Institute of Science, Bengaluru, with 75477 and 58705 followers respectively. Efforts were also made to find out the YouTube followers of the institutions. The results show that Jamia Millia Islamia, New Delhi, had the highest number of YouTube channel followers, with 31600 subscribers, and was followed by Indian Institute of Technology, Roorkee, and Indian Institute of Technology, Kanpur, with 11700 and 5950 subscribers respectively.

Table 9: Social media followers

| TWITTER FOLLOWERS | | |
|--------------------------|---|------------------------|
| Followers Rank | Institute Name | No of Followers |
| 1 | Indian Institute of Technology, Mumbai | 83889 |
| 2 | Indian Institute of Technology, Chennai | 75477 |
| 3 | Indian Institute of Science, Bengaluru | 58705 |

| | | |
|----------------------------------|--|------------------------|
| 4 | Indian Institute of Technology, Kharagpur | 48171 |
| 5 | Indian Institute of Technology, Delhi | 42810 |
| YOUTUBE CHANNEL FOLLOWERS | | |
| Followers Rank | Institute Name | No of Followers |
| 1 | Jamia Millia Islamia, New Delhi | 31600 |
| 2 | Indian Institute of Technology, Roorkee | 11700 |
| 3 | Indian Institute of Technology, Kanpur | 5950 |
| 4 | Indian Institute of Technology, Kharagpur | 5550 |
| 5 | Manipal Academy of Higher Education, Manipal | 1830 |

WISER Value

WISER stands for web indicators for scientific, technological, and innovation research. It is a web indicator that calculates the number of in-link pages, web pages, rich content files, and Google Scholar data.

$$\text{WISER} = \log(\text{visibility } 50\%) + \log(\text{size } 20\%) + \log(\text{Rich file } 15\%) + \log(\text{scholar } 15\%)$$

Table 10 pertains to the data about the WISER values of the websites studied. It is clear from the table that University of Delhi, Delhi, ranked first in the WISER index value and was followed by Bharathiar University, Coimbatore, and Jamia Millia Islamia, New Delhi. Meanwhile, Calcutta University, Kolkata, Indian Institute of Technology (Indian School of Mines), Dhanbad, and Jadavpur University, Kolkata, ranked 23rd, 24th, and 25th.

Table 10: WISER Index and Ranking

| Sr. No | Name | WISER Index Value | WISER Ranking |
|---------------|-----------------------------------|--------------------------|----------------------|
| 1 | University of Delhi, Delhi | 23.8984 | 1 |
| 2 | Bharathiar University, Coimbatore | 21.6263 | 2 |
| 3 | Jamia Millia Islamia, New Delhi | 17.1146 | 3 |

| | | | |
|----|--|---------|----|
| 4 | Jawaharlal Nehru University, New Delhi | 16.4603 | 4 |
| 5 | Indian Institute of Technology, Chennai | 16.1685 | 5 |
| 6 | Indian Institute of Technology, Kanpur | 15.9689 | 6 |
| 7 | Indian Institute of Technology, Indore | 15.7276 | 7 |
| 8 | Amrita Vishwa Vidyapeetham, Coimbatore | 15.724 | 8 |
| 9 | Savitribai Phule Pune University, Pune | 15.703 | 9 |
| 10 | Banaras Hindu University, Varanasi | 15.6059 | 10 |
| 11 | Indian Institute of Technology, Hyderabad | 15.4528 | 11 |
| 12 | Indian Institute of Science, Bengaluru | 15.2905 | 12 |
| 13 | Indian Institute of Technology, Mumbai | 15.2845 | 13 |
| 14 | Indian Institute of Technology, Guwahati | 14.965 | 14 |
| 15 | Indian Institute of Technology, Roorkee | 14.852 | 15 |
| 16 | Manipal Academy of Higher Education, Manipal | 14.4895 | 16 |
| 17 | Indian Institute of Technology , Kharagpur | 14.3514 | 17 |
| 18 | University of Hyderabad, Hyderabad | 14.1815 | 18 |
| 19 | National Institute of Technology, Tiruchirappalli | 14.0306 | 19 |
| 20 | Anna University, Chennai | 12.4271 | 20 |
| 21 | Indian Institute of Technology, Delhi | 12.3592 | 21 |
| 22 | Indian Institute of Science Education & Research, Pune | 11.6409 | 22 |
| 23 | Calcutta University, Kolkata | 11.0481 | 23 |
| 24 | Indian Institute of Technology (Indian School of Mines), Dhanbad | 10.8696 | 24 |
| 25 | Jadavpur University, Kolkata | 10.3329 | 25 |

Major findings :

According to the data from 2018–19, state public universities and private universities contributed nearly 68 percent of the Indian higher education system, and the institutions of national importance formed 12.78 percent, whereas institutions under the State Legislature Act and central open universities contributed very little. Since 2015, the NIRF has been working as a nodal agency for ranking the higher education institutions in India. Out of the

top 10 of such institutions, seven were IITs. Meanwhile, out of the top 25, 10 were IITs. The institutions have three different types of domain extension: **.ac.in**, **.edu**, and **.edu.in**. Twenty institutions (80 percent) had the domain extension **.ac.in**, followed by four (16 percent) with **.edu.in**, and one institution (4 percent) with **.edu**. The majority of the institutions' (80 percent) domains had completed more than 10 years since registration.

Indian Institute of Technology, Indore, ranked first regarding WIF (8.678343949) and was followed by the Manipal Academy of Higher Education, Manipal (0.857142857) and Indian Institute of Technology Bombay, Mumbai (0.743362832). Out of the top 25 institutions, University of Delhi, Delhi had highest number of in-links and was followed by Bharathiar University, Coimbatore, and Indian Institute of Technology, Indore. Indian Institute of Technology, Roorkee, ranked first regarding SEO and was followed by Amrita Vishwa Vidyapeetham, Coimbatore, and Indian Institute of Technology, Indore. As for security, 11 institutions' (44 percent) websites had very strong security, whereas five institutions' websites had average security and two institutions' websites had poor security.

Indian Institute of Technology, Kanpur, ranked first in the highest number of external backlinks and was followed by Indian Institute of Technology, Bombay, and Indian Institute of Technology, Kharagpur, with 3500000 and 3100000 external backlinks respectively. Anna University, Chennai, ranked first in Alexa traffic rank, with a loading time of 0.693 seconds, and was followed by the University of Delhi, Delhi, and Indian Institute of Technology, Hyderabad, with loading times of 0.723 seconds and 0.764 respectively. Among the top 25 institutions, Indian Institute of Technology, Bombay, had the highest number of followers on Twitter, with 83889 followers, and was followed by Indian Institute of Technology, Madras, and Indian Institute of Science, Bengaluru, with 75477 and 58705 followers respectively. Jamia Millia Islamia, New Delhi, had the highest number of YouTube channel followers, with 31600 subscribers, and was followed by Indian Institute of Technology, Roorkee, and Indian Institute of Technology, Kanpur, with 11700 and 5950 subscribers respectively. University of Delhi, Delhi, ranked first in the WISER index value and was followed by Bharathiar University, Coimbatore, and Jamia Millia Islamia, New Delhi.

Conclusion

The findings of this study revealed that for ensuring more presence and visibility for their websites, the institutions should pay attention to factors such as WIF, WISER value, and Alexa ranking. Website security should also be prioritised, and the necessary steps should be taken to secure the websites. In order to increase the usability of the website, proper external backlinks should be provided. It is better to upload selected informative files with proper in-linking rather than a large number of files. At the time of web designing, webometric indicators should be considered for enhancing the visibility and presence of the website.

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Appendix – I: Top 100 Indian Higher Education Institutions by NIRF for the year 2020

| Rank | Institute Name | State | Score |
|------|---|---------------|-------|
| 1 | Indian Institute of Technology Madras, Chennai | Tamil Nadu | 85.31 |
| 2 | Indian Institute of Science, Bengaluru | Karnataka | 84.18 |
| 3 | Indian Institute of Technology Delhi, New Delhi | Delhi | 81.33 |
| 4 | Indian Institute of Technology Bombay, Mumbai | Maharashtra | 80.75 |
| 5 | Indian Institute of Technology Kharagpur, Kharagpur | West Bengal | 75.85 |
| 6 | Indian Institute of Technology Kanpur, Kanpur | Uttar Pradesh | 74.99 |
| 7 | Indian Institute of Technology Guwahati, Guwahati | Assam | 68.81 |
| 8 | Jawaharlal Nehru University, New Delhi | Delhi | 68.76 |
| 9 | Indian Institute of Technology Roorkee, Roorkee | Uttarakhand | 68.48 |
| 10 | Banaras Hindu University, Varanasi | Uttar Pradesh | 62.03 |
| 11 | Calcutta University, Kolkata | West Bengal | 61.01 |
| 12 | Jadavpur University, Kolkata | West Bengal | 60.77 |
| 13 | Amrita Vishwa Vidyapeetham, Coimbatore | Tamil Nadu | 60.74 |
| 14 | Manipal Academy of Higher Education, Manipal | Karnataka | 59.96 |

| | | | |
|----|--|----------------|-------|
| 15 | University of Hyderabad, Hyderabad | Telangana | 59.92 |
| 16 | Jamia Millia Islamia, New Delhi | Delhi | 59.85 |
| 17 | Indian Institute of Technology Hyderabad, Hyderabad | Telangana | 59.59 |
| 18 | University of Delhi, Delhi | Delhi | 58.97 |
| 19 | Savitribai Phule Pune University, Pune | Maharashtra | 58.77 |
| 20 | Anna University, Chennai | Tamil Nadu | 58.1 |
| 21 | Bharathiar University, Coimbatore | Tamil Nadu | 57.32 |
| 22 | Indian Institute of Technology (Indian School of Mines), Dhanbad | Jharkhand | 56.05 |
| 23 | Indian Institute of Technology Indore, Indore | Madhya Pradesh | 55.94 |
| 24 | National Institute of Technology Tiruchirappalli, Tiruchirappalli | Tamil Nadu | 55.92 |
| 25 | Indian Institute of Science Education & Research Pune, Pune | Maharashtra | 55.43 |
| 26 | Indian Institute of Technology (BHU) Varanasi, Varanasi | Uttar Pradesh | 54.82 |
| 27 | Birla Institute of Technology & Science, Pilani | Rajasthan | 54.13 |
| 28 | Vellore Institute of Technology, Vellore | Tamil Nadu | 53.89 |
| 29 | Indian Institute of Science Education & Research Kolkata, Mohanpur | West Bengal | 53.49 |
| 30 | Homi Bhabha National Institute, Mumbai | Maharashtra | 53.2 |
| 31 | Aligarh Muslim University, Aligarh | Uttar Pradesh | 52.54 |
| 32 | National Institute of Technology Rourkela, Rourkela | Odisha | 51.87 |
| 33 | National Institute of Technology Karnataka, Surathkal | Karnataka | 51.86 |
| 34 | Institute of Chemical Technology, Mumbai | Maharashtra | 51.7 |
| 35 | Indian Institute of Technology Gandhinagar, Gandhinagar | Gujarat | 51.49 |
| 36 | Andhra University, Visakhapatnam | Andhra Pradesh | 51.24 |
| 37 | Jamia Hamdard, New Delhi | Delhi | 51.02 |
| 38 | Siksha `O` Anusandhan, Bhubaneswar | Odisha | 50.97 |
| 39 | Indian Institute of Technology Ropar, Rupnagar | Punjab | 50.92 |
| 40 | Indian Institute of Science Education & Research Bhopal, Bhopal | Madhya Pradesh | 50.83 |
| 41 | University of Madras, Chennai | Tamil Nadu | 50.76 |

| | | | |
|----|---|------------------|-------|
| 42 | Kerala University, Thiruvananthapuram | Kerala | 50.71 |
| 43 | Indian Institute of Engineering Science and Technology, Shibpur | West Bengal | 50.41 |
| 44 | Panjab University, Chandigarh | Chandigarh | 50.24 |
| 44 | Kalinga Institute of Industrial Technology, Bhubaneswar | Odisha | 50.24 |
| 46 | National Institute of Technology Warangal, Warangal | Telangana | 49.82 |
| 47 | Mysore University, Mysuru | Karnataka | 49.75 |
| 48 | Shanmugha Arts Science Technology & Research Academy, Thanjavur | Tamil Nadu | 49.4 |
| 49 | Mahatma Gandhi University, Kottayam | Kerala | 49.29 |
| 50 | King George`s Medical University, Lucknow | Uttar Pradesh | 48.91 |
| 51 | Sri Ramachandra Institute of Higher Education And Research, Chennai | Tamil Nadu | 48.59 |
| 51 | Thapar Institute of Engineering & Technology, Patiala | Punjab | 48.59 |
| 53 | Osmania University, Hyderabad | Telangana | 48.54 |
| 54 | Indian Institute of Technology Patna, Patna | Bihar | 48.09 |
| 54 | JSS Academy of Higher Education and Research, Mysuru | Karnataka | 48.09 |
| 56 | Indian Institute of Technology Bhubaneswar, Bhubaneswar | Odisha | 47.96 |
| 57 | Tata Institute of Social Sciences, Mumbai | Maharashtra | 47.45 |
| 58 | S. R. M. Institute of Science and Technology, Chennai | Tamil Nadu | 47.27 |
| 59 | Indian Institute of Science Education & Research Mohali, Mohali | Punjab | 47.19 |
| 60 | Gujarat University, Ahmedabad | Gujarat | 47.1 |
| 61 | Sathyabama Institute of Science and Technology, Chennai | Tamil Nadu | 47.03 |
| 62 | Delhi Technological University, New Delhi | Delhi | 46.89 |
| 63 | Amity University Noida, Gautam Budh Nagar | Uttar Pradesh | 46.88 |
| 64 | Alagappa University, Karaikudi | Tamil Nadu | 46.85 |
| 65 | Tezpur University, Tezpur | Assam | 46.83 |
| 66 | Saveetha Institute of Medical and Technical Sciences, Chennai | Tamil Nadu | 46.81 |
| 67 | Indian Institute of Technology Mandi, Mandi | Himachal Pradesh | 46.56 |
| 68 | Sri Venkateswara University, Tirupati | Andhra Pradesh | 46.14 |

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|----|---|-------------------|-------|
| 69 | Visva Bharati, Santiniketan | West Bengal | 45.95 |
| 70 | Koneru Lakshmaiah Education Foundation University, Vaddeswaram | Andhra Pradesh | 45.89 |
| 71 | Malaviya National Institute of Technology, Jaipur | Rajasthan | 45.65 |
| 72 | Gauhati University, Guwahati | Assam | 45.48 |
| 73 | Symbiosis International, Pune | Maharashtra | 45.43 |
| 74 | North Eastern Hill University, Shillong | Meghalaya | 45.31 |
| 75 | Dr. D. Y. Patil Vidyapeeth, Pune | Maharashtra | 45.08 |
| 76 | Calicut University, Malappuram | Kerala | 44.71 |
| 77 | Bharathidasan University, Tiruchirappalli | Tamil Nadu | 44.7 |
| 78 | University of Kashmir, Srinagar | Jammu and Kashmir | 44.67 |
| 79 | Banasthali Vidyapith, Banasthali | Rajasthan | 44.61 |
| 80 | Indian Institute of Science Education & Research Thiruvananthapuram, Thiruvananthapuram | Kerala | 44.53 |
| 81 | Pondicherry University, Puducherry | Pondicherry | 44.48 |
| 82 | Shiv Nadar University, Dadri | Uttar Pradesh | 44.47 |
| 83 | Sri Sivasubramaniya Nadar College of Engineering, Kancheepuram | Tamil Nadu | 44.42 |
| 84 | Madurai Kamaraj University, Madurai | Tamil Nadu | 44.27 |
| 85 | Birla Institute of Technology, Ranchi | Jharkhand | 44.17 |
| 85 | PSG College of Technology, Coimbatore | Tamil Nadu | 44.17 |
| 87 | Bharath Institute of Higher Education & Research, Chennai | Tamil Nadu | 44.03 |
| 88 | Guru Nanak Dev University, Amritsar | Punjab | 43.81 |
| 89 | Cochin University of Science and Technology, Cochin | Kerala | 43.71 |
| 90 | University of Jammu, Jammu | Jammu and Kashmir | 43.61 |
| 91 | Sawai Man Singh Medical College, Jaipur | Rajasthan | 43.5 |
| 92 | SVKM's Narsee Monjee Institute of Management Studies, Mumbai | Maharashtra | 43.07 |
| 93 | Motilal Nehru National Institute of Technology, Allahabad | Uttar Pradesh | 42.87 |
| 94 | National Institute of Technology Silchar, Silchar | Assam | 42.76 |
| 95 | Mumbai University, Mumbai | Maharashtra | 42.45 |

| | | | |
|-----|---|-------------|-------|
| 96 | National Institute of Technology Durgapur, Durgapur | West Bengal | 42.26 |
| 97 | Datta Meghe Institute of Medical Sciences, Wardha | Maharashtra | 42.24 |
| 98 | Bharati Vidyapeeth, Pune | Maharashtra | 42.23 |
| 99 | Lovely Professional University, Phagwara | Punjab | 41.81 |
| 100 | Mizoram University, Aizawl | Mizoram | 41.8 |