RES MILITARIS
REVUE EUROPEENNE D ETUDES EUROPEAN JOURNAL OF MILITARY STUDIES
Social Science Journal

Webometric Research: An Evaluative Review of Published Literature

Kalpana S. Mukunde

Librarian, Orange City College of Social Work, Nagpur,

Dr. Veena A. Prakashe

Information Scientist (Professor), Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur.

Keywords:

Webometrics, Websites, Link Analysis, Web Impact Factor, Link Domain, Link Analysis, Web Evaluation, WebPages, Web presence, web Analysis.

Abstract:

This paper gives a review of selected papers on Webometrics and its usage. The studies show the provenance of Webometrics, the measures, tools and techniques and analyzers of webometrics etc. They includes analysis of central universities, IIT libraries, National Importance of websites, Higher educational institutes, Library consortiums, universities with Potential for excellence, open universities etc. are covered.

Abbreviations:

University Grant Commission (UGC), Institutes of National Importance (INI), Web Impact Factor (WIF), Self Link Web Impact Factor (SLWIF), External Web Impact Factor (EWIF), Internal Web Impact Factor (IWIF), Search Engine Optimization (SEO), R-WIF (Revised- Web Impact Factor),

Introduction:

The review of literature is a main part of any type of research study. It is a analytical and descriptive precise work of completed research that supports the researcher to design the research that supports the researcher to design the research methods, ideas, techniques and approaches. The review gives researchers or readers with a general outlook of the research that has been done on a particular topic and evaluates that reviewing sources. Review of Literature contains background of the information or introduction, scope of the study, finding and conclusion and recommendation section of the study. The main purpose of the review of Literature is to focus on background knowledge on the topic and identify most relevant information and to precise the existing information, to recognize the necessity for another additional researcher, by searching the relevant research articles, books, related sources such as conference papers, journal articles, etc.

Webometric:

The term webometrics was first coined by Almind and Ingwersen (1997). Webometics is a quantitative study of web-related phenomena. The webometrics study could be applied to web with commercial search engines providing the raw data. Quantitative studies of the web have been named as webometrics by Almind and Ingwersen although the basic issue had been identified simultaneously by Larson who is also a pioneer with his early exploratory link structure analysis with the first pure informatics analysis of the web. A website is a collection of related web pages, images, videos or other digital assets that are addressed relative to a common Uniform Resource Locator (URL), often consisting of only the domain name, or the IP address, and the root path ('/') in an Internet Protocol based network. (Babu, Jayeshankar and Rao, 2010).

The term webometrics is a coinage from two modern English words, "web" and "metric". The word web is a short of WWW. The Dictionary of Science define web as: a hypermedia system… that allows to view and retrieve information from documents containing links". On the other hand, metrics has to do with counting or measurement. Webster's Comprehensive Dictionary of English Language defines metrics as: "the mathematical theory of measurement".(Babu, Jeyshankar and Rao, 2010). According to Thelwall (2009), webometrics is the study of web-based content with primarily quantitative methods for social science research goals using techniques that are not specific to one field of study, which emphasizes the development of applied methods for use in the wider social sciences.

Jalal, Biswas and Mukhaopadhyay (2009) conducted a study on Webometric analysis of Central Universities in India. Over all Webometric data were collected through Alta Vista and Yahoo, the Google search engine was used for special query syntax. The study examined that the performance of Indian Universities on the web by examining their Web presence and Web Impact Factor, number of Web pages, in-links and out-links for each universities websites, the web presence of Universities in the Web space, Web Impact Factor, Ranking of Universities of all the Universities. The Study showed that the University of Delhi occupied the first rank with 4.28 and Sikkim University became the last rank with 1.64 score among Central Universities in India. In India Central Universities were having total 66894 WebPages and 59086 outer links. The Yahoo search engine analyzed that total 2908 Web pages and 2568 in links per Universities have incredible progress in developing their websites.

Jeyshankar and Babu (2009) conducted a study on websites of Universities in Tamil Nadu. Alta Vista search engine was used for collecting data. The study attempted that analysis of universities websites, domain system, total number of web pages, and number of link pages, self link pages, external web pages, SWIF, SLWIF, EWIF and ranking of websites. The study showed that some universities have higher number of Web Pages but correspondingly their link pages are very less in number and websites fall behind in their Simple, Self Link and External Link Web Impact Factor.

Ratha, Joshi and Naidu (2012) conducted a Webometric study of IIT Libraries websites. The study covered 15 IIT Library websites for analysis and data collection and the overall study was

observational in which website structure, design, size, graphical presentation, library services and products of the websites of IIT Libraries were observed. The study examines that number of web pages, links, self links, and external links, compare various IIT Libraries for showed that the Library websites of IIT Delhi leads with total links 4070 and IIT Kharagpur with 205 on last position. The other link analysis of IIT Delhi top with 3709 and IIT Kharagpur on last position with 100. In never Active links IIT Delhi top with 75 and IIT Kharagpur with 16 on last position. The total number of Web pages IIT Bombay leads with 468 and IIT Madras with 78 on last rank. The total PDF files IIT Gandhinagar is on the top most with 78 and IIT Indore 21 on last rank. The analysis of images IIT Kharagpur is on leading position with 50 and IIT Roorkee with 6 on last position.

Thanuskodi (2012) conducted a study on analysis of selected Institutes of National Importance websites in India. The study is limited to 10 Institutes of National Importance websites in India. It examines web page Content analysis. Link Structure Analysis, Usage analysis and Web Technology analysis. The study concentrates evaluation of contents not on the link structures and other research area in Webometric. The study found that general information about home page websites features are more in IITs and lease in ISICAL and IISC. Faculty, Librarian and other staff details are given on all the websites. The Veterinary and Animal Science University is ranked first with 40 self links, Mahatma Gandhi University stands first with 156 External links, University of Calicut is ranked first among all the universities with 12612, Kerala Kalamandalam is ranked first with 24.91% of RWIF, Kerala Veterinary and Animal Science University is ranked first with 0.4494%, Kerala University is first with 1.7069% in ELWIF. Its findings have imposed to universities to stay and the websites should go to a deeper extent to make maximum number of pages indexed by the search engines. So that it becomes easier for the surfer get access to the information available on the websites.

Chakravarty and Wasne (2015) conducted a study on Library Websites of higher educational Institutes of India. They analyzed top ten Library Website of Higher Educational Institutes. Google Search engine was used for the study. In this study they calculated Web Impact factor and Revised Web Impact Factor of top most ten Library Websites of HEIs of India and in the further study Correlated both the formulas with Spearman's Rank Correlation. They calculated the number of Self Link pages, In Link pages, External Link Pages, Web Impact Factor, Correlated Web Impact Factor, Correlation between WIF and R-WIF of Library websites of HEIs of India through Spearman's Rank Correlation. In the study found that WIF and R-WIF are Correlated and association which depicts that there is very less difference between the two ranking methods. The position of Library websites of half HEIs of India is same while evaluating through both the formulas. After a survey the list of top ten HEIs of India is extracted from ranking web universities.

Verma and Brahma (2017) analysis of selected Library Consortium websites of India. They analyzed Library Consortia, Web Pages, Domain Authority, Search engine Performance, Link Equity, Internal Link, External Link, WIF and rank them as per WIF. It is found that in Domain

Authority e-ShodhSindhu with 16.61% occupied highest position, while in the Page Authority e-ShodhSindhu again occupies first place with 21.33% and highest total Linking Root Domains was occupied by DeLCon with 11 RDs. It showed External Equity-Passing Links was occupied by DeLCon with 66.53% and Total Equity-Passing Links of e-ShodhSindhu with 95.99% was the highest. It is observed that Total Internal Links of e-ShodhSindhu with 99.32% occupies the first, the Total External Links DeLCon with 66.17% ranks top and the Total Links of e-ShodhSindhu with 95.94% got the highest. It is disclosed that followed Linking Root Domains of DeLCon with 27.77% was the highest and Linking C Blocks was occupied by DeLCon with 30.55%. it is depicts the DeLCon Consortium got the highest linking root domains with total number of 11. e-ShodhSindhu cores highest with 531.27 SWIF, DeLCon with 16.26 EWIF occupies at top position. The study observed that consortium like e-ShodhSindhu and DeLCon are the most popular among the 9 selected consortia of India.

Verma and Brahma (2017) analyzed the websites of Indian Universities with status of Potential for Excellence. The paper analyzed 15 universities of India under UPE Scheme with their websites. They examine Domain authority, Web pages, Link Equity, Internal Link, External Link and Web Impact Factors of University Websites. The study showed that Domain Authority of JNU 64(8.52%) ranks at top and Page Authority of JNU with 70 (8.41%) occupies the first place. Just-Discovered Links in which University of Hyderabad with 70 got the highest and the established links of JNU with 641 RDs got the highest. The IE-PLs, EE-PLs and EE-PLs of universities in which the IE-PLs of University of Hyderabad 49.66% has the highest number of links. The EE-PLs of JNU with 21.80% has highest number of links. Total links of universities in which University of Hyderabad with 49.66% occupies the first place. Followed linking root TLRDs domains in which JNU with 19.06% ranks at top and in TLRDs JNU with 18.81% ranks at top. It is seen that JNU with 201.82 SWIF score the highest, IWIF it is found that University of Hyderabad with 126 scores the highest and EWIF it is found that JNU with 191.61 scores the highest. The study provides information about the websites of 15 UPE scheme. Most universities need to improve their ranking.

Ahmed, Batcha and Hafiz (2018) calculating Web Impact Factor of University Websites of Jammu and Kashmir. They examine and explore 12 University Websites of Jammu and Kashmir State. In the study they Identified the domain system, analyzes the number of web pages, link pages, External Link WIF, SWIF, RWIF, Google search engine used for the study. The study found that majority of the universities 5 are having .ac.in domain name. Cluster University of Jammu ranked 1 with 0.9018 in Internal Link Web Impact Factor. It is showed that Shri Mata Vaishno Devi University ranked first with 0.7241 in External link Web Impact Factor.

Pal, Sarkar and Bhattacharya (2019) analyzed study of Open Universities in India. In the Study they examined web Impact Factor, Simple WIF, Internal Link WIF, External Link WIF, Domain Extension Percentage, Loading Time, Back Links, Domain Authority, Page Auhority and Indian and Global Popularity ranking of the websites. The study attempted 14 selected Open Universities in India (1 Central and 13 State Open Universities). It had been found that among

the selected Open Universities YCMOU, Nashik holds the first position in Simple WIF with 0.2214 and Internal links WIF with 0.2092 and in EWIF Netaji Subhash Open University Kolkata holds the first position with 9.9750. It reflected that in Domain Extensions most of the websites have .ac.in with 64.29%. It is showed that IGNOU holds the best Global rank with 4439 and has the maximum number of back links ie. 1265605. It seems that KSOU having highest Domain Authority with59. In case of Page Authority IGNOU ranks first with 59.

Conclusion:

Webometric Studies tries to measure the World Wide Web to get knowledge about the number of hyperlinks, structure of the World Wide Web and using patter. The Webometric study covers Web page Content Analysis, Web link Structure Analysis: Internal Link, External Link, Hyperlink, etc. Web usage Analysis, Search Engine Performance, Web Impact Factor, Simple Web Impact Factor etc. 10 literatures was reviewed in the research paper. From analysis it was found that most of the Webometric Studies on various organizations/ Institutions or Universities websites were done during 2009-2020. Jalal, Biswas & Mukhaopadhyay (2009) tried to give a ranking to Central Universities in India with related indicators eg. SWIF, EWIF, IWIF etc. Jeyshankar & Babu (2009) analyzed the Tamil Nadu Universities websites and Domain System. Ratha, Joshi & Naidu (2012) conducted study on 15 IITs Library Websites, in which website structure, design, size and graphical presentation etc. were observed. Thanuskodi (2012) conducted study on 10 selected institutes of National Importance Websites in India; the study concentrates evaluation of contents not on the link structures and other research area in Webometric. Chakravarty & Wasne (2015) they study on Library Websites of Higher Educational Institutes of India. They calculated WIF & RWIF of top most 10 Library Websites of HEIs of India. Verma & Brahma (2017) analyzed selected Library Consortium Websites of India, they examines Library Consortia Web Pages, Domain Authority, Search Engine Performance, WIF & Rank them as per WIF. Verma & Brahma (2017) analyzed Websites of Indian Universities with Status of Potential for Excellence, they analyzed 15 Universities of India under UPE Scheme with their websites. Ahmed, Batcha & Hafiz (2018) calculating Web Impact Factor of Universities Website of Jammu & Kashmir, they examines 12 University Websites. Pal, Sarkar & Bhattacharya (2019) analyzed study of Open Universities in India, they examined SWIF, IWIF, EWIF, Domain extension, Percentage, Loading time, Back Links, Domain & Page Authority and Indian & Global Popularity Ranking etc.

Systematic Reviews:

This systematic reviews extracts and interprets data from published studies on the webometric, then analyzes on different parameters like purpose of study, method used, time frame of the study, sample size, data collection tools, search engines etc. describes it and summarizes interpretations into a refined findings.

Study	Study Purpose	Method	Time Frame	Sample Size	Data Collection Tool	Search Engine	Findings
Jalal, S.K., Biswas, S.C. & Mukhopadhyaya, P. Webometric Analysis of Central Universities in India: A Study	To identify the ranking of Central Universities in India using appropriate Webometric indicators.	Observational	March 28 to April 3, 2009	23 Central Universities	For collecting the data following Webometric indicators are used: 1.domain: domainname 2.linkdomain:domainname 3.linkdomain:domainname-domain:domainname 4.linkdomain:domainname domain:domain	Google Altavista Yahoo Exalead MSN & Google Scholar	-As per WIF-links, Aligarh Muslim University of the top rank whereas Univ. of Delhi occupied top rank based on WISER. -low correlation between WISER rank and WIF-inlink for the case of Indian Central Universities -University of Delhi is having the highest WebPages whereas Aligarh Muslim University is having highest number of inlinks -Having world rank, university of Delhi occupied top position among Central Universities in India.
Jeyshankar, R. & Babu, R. 2009. Websites of Universities in Tamil Nadu: A Webometric Study	Identifies the domain systems of the websites; analyses the number of web pages and link pages and calculates the WIF, SLWIF, EWIF and rank them as per the WIF.	Observational	27th October 2008 to 26th October 2008	45 Universities	The data collection method extensively makes use of four special keywords like domain, link domain, link domain AND domain, and link domain AND NOT domain from Altavista Search engines.	Altavista	This study reflects that some Universities have higher number of webpages but correspondingly their link pages are very small in number and websites fall behind in their Simple self link and external link Web Impact Factors.
Ratha, B., Joshi, L. & Naidu, G.H.S., 2012. Webometric study of IIT Libraries Websites.DESIDOC Journal of Library & Information Technology, Vol.32, No. 03, May 2012, pp.249-	An analysis of design and structure of the Library websites of IITs.	Observational	-	15 IIT Libraries websites in India	Primary data collected from the websites of IIT libraries then input the primary data according to different point of view in the MS-excel sheet. The secondary data was collected from books, journals, internet, conference proceedings and other sources.	Google	IIT Delhi has the highest number of total links. IIT Bombay library is at the top most never active links but it has more informative than other websites. IIT Gandhinagar has highest number of PDF files. IIT Bombay, Madras & Delhi provide the user supporting services. IIT Bombay& Delhi are also available in Hindi language. IIT Madras, Delhi & Bombay websites are updating continuously.

254.							
Thanuskodi, S. 2012. A Webometric analysis of selected institutes of National Importance websites in India. Institutional Journal of Library Science 1(1): 13-18	The Study concentrates evaluation of content not on the link structures and other research area in Webometric.	Observational	--	10 Institutes of National Importance Websites in India	The webometric analysis can be performed through the number of webpages, number of rich files, number of inlinks and self link and see the number of Internet users, percentage of literacy, number of hosts, ICT literate & high-speed broadband facilities with help of Webometric indicators.	Yahoo, Alta Vista & Google	All the websites provide links to home page which includes About Us, Vision, Mission, Authority details, Faculty members list, Activities, Institutes Publication, Conference announcements, news & events are not provided by many of the websites. Some of the websites provide links to Consortium, sitemap of websites is provided by all institutes, feedback facility are provided by all IITs. Services provided by institutes are mentioned on websites & Activities done by institutes & student are showed on websites. Publication, Authority, Accuracy & Currency of websites are available on websites. Evaluating Features & Special Features can be viewed on websites. Suggestions & Improvement are also showed on all he websites.
Chakravarty, R. & Wasan, S., 2009. Webometric analysis of Library websites of Higher Educational Institutes (HEIs): A study through search engine	To evaluate the Library websites performance Webometric tools and indicators are required.	Observational	25th April 2015	Top 10 Higher educational Institutes of India	Google search engine is used to collect data. Utilizing Boolean operators different formulations were used which resulted in different outcomes. Spearman's Ran Correlation tool for calculating the relationship between WIF & R-WIF	Google	Calculation of WIF & R-WIF through Google search engine for evaluating top ten websites of HEIs of India and further correlating these formulas through Spearman's Rank Correlation shows positive and strong relationship between WIF & R-WIF. This closeness implies that there is much association between these two formulas. It was found that ranking of half library websites of HEIs of India is same while evaluating through both the formulas whereas half of Library websites secured different ranks while ranking through WIF & R-WIF.
Verma, M. F. & Brahma, K. 2017. Webometric analysis of selected library consortium websites of India: an evaluative study. 11th International CALIBER- 02-04-August 2017: 328-	To examine the websites of selected library consortia in India by analyzing the total number of webpages, domain authority, equity links, internal & external links & WIF.	Observational	--	9 Selected library consortia of India	The data were collected from the Library Consortium websites using the tool Open Site explorer	Google	Study provides information about the websites of selected library consortium in India & the finding clearly show the present scenario of websites of selected library consortia & found that e-shodhsindhu & DeLCon are the most popular consortia among the selected once.

341							
Verma, M. F. & Brahma,2017.Webometric analysis of websites of Indian universities with status of Potential for Excellence. SRELS Journal of Information Management, Vol.54(6) Dec.2017, p.318-326	To examine & analyze the websites of Indian Universities with status of potential for excellence on the basis of established Webometric criteria.	Observational	--	15 Indian UPE	The data were collected from the universities websites using open site explorer which is a search engine optimization tool for links.	Google	Among the 15 universities of UPE JNU tops with the highest domain authority, JNU again tops with the highest page authority. University of Hyderabad scores high in terms of just-discovered links. JNU has got the highest number of established links. The equity-passing links are the links which pass value from one page to another JNU again top in this. JNU has the highest SWIF and EWIF, university of Hyderabad has the highest IWIF.
Ahmad, M. Batcha, M.S. Rashid, W. & Hafiz, O. 2018. Calculating web impact factor for university websites of Jammu & Kashmir: a study. International Journal of science technology & Management, vol.7(5) May 2018.	Identifies the domain systems of the websites: analyze the number of webpages & link pages, and calculates the ELWIF or SWIF and EWIF of all the university websites.	Survey method	May 2018	12 universities in the state of Jammu & Kashmir	Small SEO tool and SEO chat application to collect data	Google & Yahoo	WIF is becoming a more reliable indicator worldwide to measure the scientific utility of websites. Study concludes that WIF, being a quality indicator helps in measuring the utility of a website, rather than measuring its overall impact on the web. Cluster university of Jammu ranked 1 in IWIF & Shri Mata Vaishno Devi University 1 in EWIF.
Pal, A., Sarkar, A., Bhattacharya, U. 2019. Webometric analysis of Open universities in India. Library Philosophy and Practice (e-journal) 3038.	Study predominantly focus on Web Impact Factors of the Indian Open University websites.	Observational method	5 to 7 April 2019	14 Selected open universities in India (1 Central & 13 State Open Univ.)	Online SEO report generation tool, Neil Patel's SEO analyzer has also been used to analyze and compare India's Open University websites & Alexa tool has been used for popularity ranking of the websites.	Google	Study focus on the WIFs of the Indian open university websites. Calculating three types of WIF it has been found that YCMOU holds numero uno status in Simple & ILWIFs holds the best Global rank, EWIF Netaji Subhash Open Univ. holds the rank one position.

References:

Almind, T.C., & Ingwersen, P. (1997). Informetric Analyses on the World Wide Web: Methodological Approaches to Webometrics. Journal of Documentation, 53 (4), 404-426.

Ahmed, M., Batcha, M.S., Rashid, W., & Hafiz, O. (2018). Calculating Web Impact Factor for University Websites of Jammu and Kashmir: a study. International Journal of Science Technology and Management, 07 (05), 17-27.

Bjorneborn, L., & Ingwersen, P. (2004). Towards a Basic Framework for Webometrics. Journal of the American Society for Information Science and Technology, 55 (14), 1216-1227.

Chakravarty, R. & Wasan, S. (2015). Webometric Analysis of Library Websites of Higher Educational Institutes of India: A study through Google Search Engine. DESIDOC Journal of Library & Information Technology, 35 (5), 325-329.

Jalal, S.K., Biswas, S.C. & Mukhopadhyay, P. (2019). Webometric Analysis of Central Universities in India: A Study. https://www.researchgate.net/publication/224110355

Jayeshankar, R. & Babu R. (2009). Websites of Universities in Tamil Nadu: A Webometric Study. Annals of Library and Information Studies, 56(6), 69-79.

Pal, A., Sarkar. A. & Bhattacharya U. (2019). Webometric Analysis of Open Universities in India. Library Philosophy and Practice (e-journal). 3038.

Pathak, T. & Verma, M. K. (2021). Webometric Research: A Critical Review of Published Literature. In book: Library and Resource Management in Knowledge Society, Publisher: Shree Publications and Distributors, 416-425

Thomas, O. & Willete, P. (2000). Webometric Analysis of Department of Librarianship and Information Science. https://www.researchgate.net/publication/33037123

Ratha, B., Joshi, L. & Naidu, G.H.S. (2012). Webometric Study of IIT Libraries Websites. DESIDOC Journal of Library & Information Technology, 32(3), 249-254.

Thanuskodi, S. (2012). A Webometric Analysis of selected Institutes of National Importance Websites in India. International Journal of Library Science, 1 (1), 13-18.

Verma, M.K. & Brahma, K. (2017). Webometric Analysis of Selected Library Consortium Websites of India: An Evaluative Study. 11th International CALIBER-2017, 328-341

Verma, M.K. & Brahma, K. (2017). Webometric Analysis of Websites of Indian Universities with status of Potential for Excellence. SRELS Journal of Information Management, 54(6), 318-326.