Web Presence of State Universities of Bihar, India: A Webometric Analysis

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Abstract

The purpose of this research paper is to investigate the web presence, Web Impact Factor (WIF), Domain Authority (DA), and Page Authority (PA) of the websites of all State Universities of Bihar, India. The current study is intended to analyse the 18 websites of State Universities situated in Bihar, India and Search Engine Optimization (SEO) tools viz., Link Explorer (moz) was used to collect the required data for the study. Manual website visits were also done to collect the relevant data. Magadh University scored the highest SWIF and RWIF, with 13,150 and 0.500, respectively. Purnea University scored the highest SLWIF of 0.59, indicating a strong internal linking structure, while Jai Prakash University (JPU) has the highest ELWIF of 1.06, reflecting high external visibility. Very few studies have been conducted on the state universities of Bihar. So, it is an attempt to fill this research gap. Authors, Administrators, and Webmasters may benefit from this study.

Keywords: ELWIF, RWIF, SLWIF, Search Engine Optimization, University Website, Web Impact Factor, Webometric Analysis, Webometric Studies.

1.   Introduction

The World Wide Web (WWW) is the reason behind the emergence of webometrics. The WWW has become a major source of information for research and academic activities. Thus, webometrics is the best way to evaluate the different aspects of websites. The web is becoming more complex daily, and it is hard for many websites to appear on top of search engine result pages. To improve a website's visibility, webometric tools help analyse the web qualitatively and quantitatively.

The term webometrics is the combination of two words, "web" and "metrics" which means- to measure the 'quantitative aspects' of websites (Bjorneborn & Ingwersen, 2004). The term "webometrics" was coined by two persons named Almind and Ingwersen in 1997. Webometrics is concerned with measuring aspects of the Web, such as websites, web pages, parts of web pages, words in web pages, hyperlinks, web search engine results, etc. Webometrics covers research of all network-based communication using informetric or other quantitative

measures (Almind & Ingwersen, 1997).

2.   Review of the Related Literature

Bakkiyaraj and Kalidasan (2023) examined the number of web pages, total links, internal links, external links, and backlinks to calculate web impact factors of Physical Education Institutions' websites. Dapsi (2023) quantitatively analysed 35 selected technological institutes in India based on the NIRF 2022 ranking. Singh and Devi (2024) comprehensively evaluated its efficacy in archiving websites of technical institutions in Northeast India. Dutta and Ghosh (2023) did a study on Sidho-Kanho-Birsha University, indicating that many institutions struggle to implement effective information architecture strategies, hindering user engagement and satisfaction. Dinda and Rahman (2023) examined nine websites belonging to Indian libraries and information networks. They analysed numerous website data, including web meta-information, page quality and structure, metrics, domain analysis, traffic engagement, internal and external links, SEO score, performance score, and accessibility score.

Suman and Patel (2023) conducted a webometric study on seven central universities of Eastern India. Domain authority, page authority, Google PageRank, rich files, language of the website content, and social media presence of the universities were analysed using search engine optimisation tools. Verma and Singh (2023) used webometric indicators to examine the library websites of the top 10 universities. It also looks at the websites based on different linkages and assigns a ranking based on internal and external web impact factor elements. Tunga (2021) evaluated the web based content analysis of University library websites of State Aided Universities in Kolkata, West Bengal. Uttkarsh and Sonkar (2021) calculated the four types of web impact factor (WIF) of Knowledge Resources Heritage of India. Using the Google search engine, the authors calculated the SWIF, SLWIF, EWIF, and RWIF.
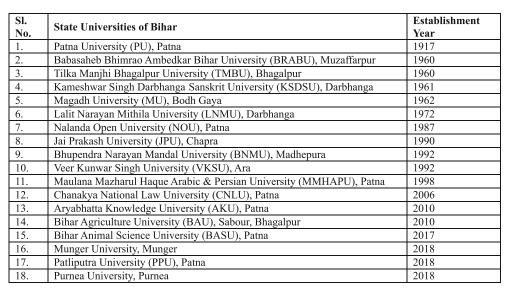
3.   Objectives of the Study

The specific objectives of this study are as follows:

❖ To identify the web presence and domain of the state universities of Bihar.

❖ To evaluate the number of Domain and Page Authority of the websites under study.

❖ To find out the number of linked pages, self-links, external links, and in-links of the websites under study.

❖ To calculate the various Web Impact Factors (WIF), i.e. Simple WIF, Self-links WIF, External-links WIF, and Revised WIF of the websites.

4.   Scope of the Study

Currently, there are a total of eighteen Government Universities in Bihar, and all these 18 Universities have been taken for the study. The list of State Universities situated in Bihar was combinedly collected from the websites of Raj Bhawan Bihar (https://governor.bih.nic.in/universities-in-bihar/#) and the UGC. The table below lists the all-State Universities of Bihar with their respective abbreviation used in the study.

Sl. No.	State Universities of Bihar	Establishment Year
1.	Patna University (PU), Patna	1917
2.	Babasaheb Bhimrao Ambedkar Bihar University (BRABU), Muzaffarpur	1960
3.	Tilka Manjhi Bhagalpur University (TMBU), Bhagalpur	1960
4.	Kameshwar Singh Darbhanga Sanskrit University (KSDSU), Darbhanga	1961
5.	Magadh University (MU), Bodh Gaya	1962
6.	Lalit Narayan Mithila University (LNMU), Darbhanga	1972
7.	Nalanda Open University (NOU), Patna	1987
8.	Jai Prakash University (JPU), Chapra	1990
9.	Bhupendra Narayan Mandal University (BNMU), Madhepura	1992
10.	Veer Kunwar Singh University (VKSU), Ara	1992
11.	Maulana Mazharul Haque Arabic & Persian University (MMHAPU), Patna	1998
12.	Chanakya National Law University (CNLU), Patna	2006
13.	Aryabhatta Knowledge University (AKU), Patna	2010
14.	Bihar Agriculture University (BAU), Sabour, Bhagalpur	2010
15.	Bihar Animal Science University (BASU), Patna	2017
16.	Munger University, Munger	2018
17.	Patliputra University (PPU), Patna	2018
18.	Purnea University, Purnea	2018

Source: UGC consolidated list of all Universities

5. Research Methodology

A quantitative research design was employed, focusing on measurable webometric indicators to assess the online presence of State Universities in Bihar. Currently, there are a total of eighteen Government Universities in Bihar, and all these 18 universities have been taken under the study. Google search engine (www.google.com) query syntax, as shown in Table 3, and Search Engine Optimization (SEO) tools viz., Link Explorer (https://moz.com/link explorer) was used to collect the required data for the study. Manual site visits were also conducted to collect the relevant data. The data required for the present study was collected from May 08 to May 10, 2024. Descriptive statistics and Microsoft Excel statistical tools were used to tabulate and summarise the different webometric indicators. Further, it is also used to analyse and evaluate all four types of web impact factors, i.e., SWIF, SLWIF, ELWIF, and RWIF.

6. Data Analysis and Interpretation

The collected data has been analyzed and presented in the following sections. The findings of the study are discussed as under:

6.1 Web presence and domain analysis

Table 1 depicts that all state universities of Bihar have a web presence with their own websites. It was found that all universities' websites were properly functional and updated except TMBU, Bhagalpur. At the time of data collection, TMBU, Bhagalpur website was not functioning.

Table 1: Web presence and website domain of state universities of Bihar

Sl. No.	State Universities of Bihar	Web Presence / Website Link	Top-Level Domain
1.	PU, Patna	https://pup.ac.in/	.ac.in
2.	BRABU, Muzaffarpur	https://brabu.ac.in/	.ac.in
3.	TMBU, Bhagalpur	http://www.tmbuniv.ac.in/	.ac.in
4.	KSDSU, Darbhanga	https://www.ksdsu.edu.in/	.edu.in
5.	MU,Bodh Gaya	https://www.magadhuniversity.ac.in/	.ac.in
6.	LNMU, Darbhanga	https://lnmu.ac.in/	.ac.in
7.	NOU, Patna	https://www.noubihar.ac.in/	.ac.in
8.	JPU, Chapra	https://jpv.ac.in/	.ac.in
9.	BNMU, Madhepura	https://bnmu.ac.in/	.ac.in
10.	VKSU, Ara	https://vksu.ac.in/	.ac.in
11.	MMHAPU, Patna	https://mmhapu.ac.in/	.ac.in
12.	CNLU, Patna	https://cnlu.ac.in/	.ac.in
13.	AKU, Patna	https://akubihar.ac.in/	.ac.in
14.	BAU, Sabour, Bhagalpur	https://bausabour.ac.in/	.ac.in
15.	BASU, Patna	https://basu.org.in/	.org.in
16.	Munger University, Munger	https://www.mungeruniversity.ac.in/	.ac.in
17.	PPU, Patna	https://www.ppup.ac.in/	.ac.in
18.	Purnea University, Purnea	https://www.purneauniversity.ac.in/	.ac.in

Table 1 also shows the Top-Level Domain (TLD) or simply the domain name of all universities' websites. KSDSU, Darbhanga website has ".edu.in" domain name and BASU, Patna website has ".org.in" domain name, while the rest of the university websites use the same ".ac.in" domain name or TLD.
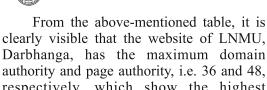
6.2 *Data collection through Open Site Explorer*

Table 2 shows the Domain Authority and Page Authority of the websites of 18 state universities of Bihar.

Table 2: Domain Authority [DA] and Page Authority [PA] of the websites

Sl. No.	State Universities of Bihar	Domain Authority	Page Authority
1.	PU, Patna	33	40
2.	BRABU, Muzaffarpur	24	30
3.	TMBU, Bhagalpur	34	44
4.	KSDSU, Darbhanga	30	34
5.	MU, Bodh Gaya	34	45
6.	LNMU, Darbhanga	**36**	**48**
7.	NOU, Patna	2	9
8.	JPU, Chapra	28	35
9.	BNMU, Madhepura	33	43
10.	VKSU, Ara	32	44
11.	MMHAPU, Patna	30	39
12.	CNLU, Patna	35	41
13.	AKU, Patna	33	45
14.	BAU, Sabour, Bhagalpur	34	42
15.	BASU, Patna	31	34
16.	Munger University, Munger	32	40
17.	PPU, Patna	31	43
18.	Purnea University, Purnea	32	41

From the above-mentioned table, it is clearly visible that the website of LNMU, Darbhanga, has the maximum domain authority and page authority, i.e. 36 and 48, respectively, which show the highest performance on the Web among all the websites under study. Meanwhile, NOU, Patna has the least domain and page authority, i.e., 2 and 9, respectively, which show the lowest performance on the Web among the websites under study.

6.3 Web Impact Factor of websites of state universities in Bihar

Web Impact Factor (WIF) is calculated by dividing the number of links by the total number of web pages the specific website has. five Boolean search formulas (Google query syntax) were used to collect the required data for the study, as shown in Table 3.

Tables 4 to 7 represent the Simple Web Impact Factor (SWIF), Internal Web Impact

Table 3: Query syntax for Google search engine

Sl. No.	Syntax/Command	Result
1.	site:URL	This syntax used to determine the number of web pages of that particular URL or website
2.	link:URL	This syntax used to determine the num ber of web pages (linked) with hyperlinks in that particular website.
3.	link:URL AND site:URL	This syntax used to determine the number of internal links i.e. self -links of that particular website.
4.	link:URL AND NOT site:URL	This syntax used to determine the number of external links, i.e. links going out of that particular website to the other websites.
5.	link:URL NOT site:URL	This syntax used to determine the total number of links incoming to that particular website from other websites, i.e. in-links.

Factor (IWIF), External Web Impact Factor (EWIF), and Revised Web Impact Factor (RWIF) of the websites of 18 state universities of Bihar, respectively.

6.4. Simple Web Impact Factor (SWIF) of State Universities of Bihar

The data distribution by Simple Web

Impact Factor (SWIF) and the ranking of Bihar's state universities according to their SWIF score are displayed in Table 4. The SWIF is calculated as the total number of links of a website divided by the total number of web pages of that specific website.

Table 4: SWIF of State Universities of Bihar

State Universities of Bihar	Total Number of Web Pages	Total Number of Linked Web Pages	Simple Web Impact Factor (SWIF)	Rank
MU, Bodh Gaya	6	78,900	13,150	1
PU, Patna	2,420	2,36,00,000	9,752.06	2
BASU, Patna	8490	3,80,00,000	4,475.85	3
JPU, Chapra	129	4,47,000	3,465.11	4
TMBU, Bhagalpur	8	10,900	1,362.50	5
Purnea University, Purnea	423	3,23,000	763.59	6
LNMU, Darbhanga	1340	1,52,000	113.43	7
BRABU, Muzaffarpur	550	50,500	91.81	8
VKSU, Ara	612	52,500	85.78	9
BNMU, Madhepura	826	44,800	54.23	10
Munger University, Munger	1340	33,300	24.85	11
BAU, Sabour, Bhagalpur	1840	32,000	17.39	12
NOU, Patna	427	6,920	16.20	13
AKU, Patna	684	9,980	14.59	14
CNLU, Patna	3280	37,200	11.34	15
KSDSU, Darbhanga	1120	11,400	10.17	16
PPU, Patna	4430	30,800	6.95	17
MMHAPU, Patna	7320	9,410	1.28	18

The website of MU, Bodh Gaya, has the highest Simple Web Impact Factor (SWIF) of 13,150 and secured the first rank among the 18 websites under study. PU, Patna, and BASU, Patna websites have SWIFs of 9,752.06 and 4,475.85, respectively, and ranked second and third, respectively. MMHAPU, Patna, has the lowest simple web impact factor of 1.28 and ranked last in the list.

6.5 Self-link Web Impact Factor (SLWIF) of State Universities of Bihar

Table 5 shows the data distribution by the Self-link Web Impact Factor (SLWIF), and all the websites are ranked according to their SLWIF score. The SLWIF is calculated as the total number of self-links of the websites divided by the total number of web pages of that specific website.

Table 5: SLWIF of State Universities of Bihar

State Universities of Bihar	Number of Web Pages	Number of Self-links	Self-link Web Impact Factor (SLWIF)	Rank
Purnea University, Purnea	423	250	0.59	1
VKSU, Ara	612	323	0.52	2
MU, Bodh Gaya	6	3	0.50	3
BAU, Sabour, Bhagalpur	1840	907	0.49	4
JPU, Chapra	129	62	0.48	5
BRABU, Muzaffarpur	550	230	0.41	6
NOU, Patna	427	149	0.34	7
LNMU, Darbhanga	1340	345	0.25	8
AKU, Patna	684	159	0.23	9
CNLU, Patna	3280	584	0.17	10
PU, Patna	2,420	393	0.16	11
PPU, Patna	4430	726	0.16	12
TMBU, Bhagalpur	8	1	0.12	13
BNMU, Madhepura	826	105	0.12	14
BASU, Patna	8490	783	0.09	15
MMHAPU, Patna	7320	388	0.05	16
Munger University, Munger	1340	78	0.05	17
KSDSU, Darbhanga	1120	29	0.02	18

Purnea University's website has the highest SLWIF of 0.59 and is ranked first. VKSU, Ara, and MU, Bodh Gaya's websites have SLWIFs of 0.52 and 0.50, respectively, and are ranked second and third, respectively. LNMU, Darbhanga's website, has the lowest SLWIF of 0.02 and is ranked last in the list of 18 websites under study.

6.6 External Link Web Impact Factor (EWIF) of State Universities of Bihar

The distribution of data by external link web impact factor (EWIF) is shown in Table 6, and the websites are ranked based on their EWIF score. The EWIF is computed by dividing the total number of external links on a website by the total number of web pages on that specific website.

Table 6: ELWIF of State Universities of Bihar

State Universities of Bihar	Number of Web Pages	Number of External Links	External Link Web Impact Factor (ELWIF)	Rank
JPU, Chapra	129	138	1.06	1
BAU, Sabour, Bhagalpur	1840	1020	0.55	2
MU, Bodh Gaya	6	3	0.50	3
Purnea University, Purnea	423	204	0.48	4
VKSU, Ara	612	166	0.27	5
TMBU, Bhagalpur	8	2	0.25	6
BRABU, Muzaffarpur	550	136	0.24	7
CNLU, Patna	3280	795	0.24	8
AKU, Patna	684	158	0.23	9
LNMU, Darbhanga	1340	264	0.19	10
NOU, Patna	427	82	0.19	11
PU, Patna	2,420	344	0.14	12
PPU, Patna	4430	613	0.13	13
BASU, Patna	8490	812	0.09	14
MMHAPU, Patna	7320	548	0.07	15
Munger University, Munger	1340	102	0.07	16
BNMU, Madhepura	826	49	0.05	17
KSDSU, Darbhanga	1120	40	0.03	18

From Table 6, it is visible that the website of JPU, Chapra, has the highest External Link Web Impact Factor of 1.06 and ranked first in the list of 18 websites of state universities of Bihar. It is followed by BAU, Sabour, Bhagalpur, with an ELWIF of 0.55 and ranked second. Similarly, MU, Bodh Gaya, has an ELWIF of 0.50 and is ranked third among others. KSDSU, Darbhanga website has the least ELWIF of 0.03 and ranked last.

6.7 Revised Web Impact Factor (RWIF) of State Universities of Bihar

Table 7 shows the distribution of data by Revised Web Impact Factor (RWIF), and all the websites are ranked according to their RWIF. The revised web impact factor is calculated as the total number of in-links, i.e., links coming from other websites divided by the total number of web pages on that particular website.

Table 7: RWIF of State Universities of Bihar

State Universities of Bihar	Number of Web Pages	Number of In-Links	Revised Web Impact Factor (RWIF)	Rank
MU, Bodh Gaya	6	3	0.500	1
BAU, Sabour, Bhagalpur	1840	299	0.162	2
CNLU, Patna	3280	480	0.146	3
TMBU, Bhagalpur	8	1	0.125	4
PU, Patna	2,420	276	0.114	5
AKU, Patna	684	75	0.109	6
BASU, Patna	8490	803	0.094	7
LNMU, Darbhanga	1340	79	0.058	8
NOU, Patna	427	25	0.058	9
JPU, Chapra	129	6	0.046	10
VKSU, Ara	612	28	0.045	11
BRABU, Muzaffarpur	550	21	0.038	12
MMHAPU, Patna	7320	226	0.030	13
Munger University, Munger	1340	41	0.030	14
PPU, Patna	4430	126	0.028	15
Purnea University, Purnea	423	5	0.011	16
BNMU, Madhepura	826	8	0.009	17
KSDSU, Darbhanga	1120	5	0.004	18

The MU, Bodh Gaya website has the highest Revised Web Impact Factor of 0.5 and ranked first, followed by the websites of BAU, Sabour, Bhagalpur and CNLU, Patna, with RWIF of 0.162 and 0.146 respectively. KSDSU, Darbhanga, has the lowest RWIF of 0.004 and is last on the list of Bihar's 18 state universities' websites.

7.   Major Findings

The key findings of this research paper have presented as under:

❖ All state universities of Bihar have a web presence with their own websites. All universities' websites were properly functional and updated except the TMBU, Bhagalpur website.

❖ The majority of 16 websites, out of 18 websites of state universities of Bihar, have domain name ".ac.in" except KSDSU, Darbhanga and BASU, Patna, which have TLD ".edu.in" and ".org.in" respectively.

❖ The website of MU, Bodh Gaya, has the highest SWIF of 13,150 and is ranked 1st in the list of SWIF of 18 state universities of Bihar. Meanwhile, the website of MMHAPU, Patna, has the lowest SWIF of 1.28.

❖ The website of Purnea University, Purnea, has the highest SLWIF of 0.59, and LNMU, Darbhanga website, has the lowest SLWIF of 0.02.

❖ The website of JPU, Chapra, has the highest ELWIF of 1.06, and the KSDSU, Darbhanga University website has the lowest ELWIF of 0.03.

❖ The Magadh University, Bodh Gaya website has the highest RWIF of 0.5, and KSDSU, Darbhanga University website has the lowest RWIF of 0.004.

8. Conclusion and Suggestions

The study also suggests that website developers must include more information and valuable content on their respective websites. Webmasters should also consistently provide up-to-date information on the websites of related universities. This will increase the websites' In-links/backlinks, which increases their web impact factor so that people may visit them frequently. Thus, webmasters, policymakers, or university administrations may use this study and design websites to be more informative and attractive to improve their visibility on the Web. Looking ahead, this research opens several avenues for future exploration. Further studies could expand to include private universities in Bihar and other regions of India to facilitate comparative analyses, or comparative studies of general universities and technical universities could be conducted.

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