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Webometrics study of Universities in Bangladesh

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Very few studies have been conducted on webometrics studies in Bangladesh. But the present article reports webometric study of all university websites in Bangladesh. Data for the study obtained using AltaVista search engine was used to rank the websites based on webometric indicators. It is found that some universities in Bangladesh have higher number of web pages but their link pages are fewer and websites fall behind in their web impact factor. Some suggestions to improve the WIF of the university websites in Bangladesh are given.

Introduction

In the internet age, university websites are very important for to their stakeholders and there is a need to assess their ranking[1]. Webometrics is the study of the quantitative aspects of the construction and use of information resources, structures and technologies on the Web, drawing on bibliometric and informetric approaches[2]. It covers research of all network based communication using informetric or other quantitative measures. Webometrics, in future, may become one of the most interesting research areas for the vast collection of electronic information available on the publicly indexable web[3]. Paisley[4] rightly identified this area as the future domain of bibliometric research.

University websites introduce universities, their related institutions and departments, resources and services, faculty members, students, alumni and so on. It is beyond doubt that one of the important factors for the success of a university is its website, web accessibility and in particular its visibility on the web[5].

Bangladesh is a developing country and the present literacy rate of the country is 47.9 percent[6]. The University Grants Commission (UGC) of Bangladesh is the statutory apex body in the field of higher education in Bangladesh. At present there are 54 private, 31 public and 3 international universities in operation across the country[7]. Sobhan and Dey[8] have stated that in order to keep the universities in the race of higher education and scholarly communication, all the universities have to use ICT for their academic and other related purposes. Some leading public and private universities in Bangladesh are using ICT for enhancing academic excellence including providing library services, online services and web based services to their users.

Webometrics and Web Impact Factor

Different metrics studies in library and information science such as librametrics, bibliometrics, scientometrics and informetrics are well known. The recent years have witnessed the emergence of webometrics or cybermetrics[9]. Bibliometric tools and techniques have been used to provide an understanding of the dynamics of disciplines, developing policy and justifying research funding. Since 1996, increasing efforts have been made to investigate the web as a significant scholarly medium for science and scholarship by applying bibliometrics techniques[10]. Terms applied to this new area of study include "webometrics"[11]. Webometrics is a quantitative study of web-related phenomena and webometrics studies could be applied to web with commercial search engines providing the raw data[12]. Bjorneborn and Ingwersen[13] focused on the following four areas of webometrics study:

- Web page content analysis;
- Web link structure analysis (e.g. hyperlink, self link and external link);
- Web usage analysis (e.g. exploiting log files for users searching and browsing behavior); and

- Web technology analysis (including search engine performance)

Web Impact Factor (WIF) is a part of the methodology in webometrics studies. The idea of measuring WIF as one of the quantitative indicators (or the average link frequencies) was developed by Ingwersen[14]. WIF is a snapshot of a search engine database at a specific time. The higher the WIF, the greater the perceived reputation of the website. The idea of applying revised WIF techniques to the web was proposed by Noruzi[15]. The WIF provides quantitative tools for ranking, evaluating, categorizing, and comparing websites, and top-level domains and sub-domains. Three types of links and WIF are formulated in the following way:

The simple WIF: The ratio of all links to the number of pages

The self link WIF: The ratio of selflinks within the site to number of pages

The external WIF: The ratio of links made from external sites to the target site, to the number of pages at the site.

In general, a web site with a higher impact factor may be considered to be more prestigious or of a higher quality than those web sites with a lower impact factor.

Literature review

The science of webometrics and the study of links created between web pages try to determine a model for scientific usage of the web and also information resources with highest impact on the web using the new calculating methodologies to measure inlinks of the web pages[16] . The concept of WIF was introduced first in 1997 by a Spanish researcher, Rodriguez Gairín[17]. The basic idea of this concept came from journal impact factor (JIF) which was introduced by Garfield in 1960s and used by the Institute of Scientific Information (ISI) to select the scientific journals for citation indices ever since[18]. WIF is an indicator to measure and compare efficiency, attractiveness, and success of websites at a broad level such as country domains or a limited level such as academic websites. Absolute WIF or External WIF is the ratio of external inlinks to the web pages indexed by search engines.

Since mid 1990s, there have been lots of efforts to study the structure and characteristics of the web by itself. Several studies show that websites can be compared and ranked in different domains based on their impact factor. Ingwersen[14] calculated the web impact factor for some Danish domains and websites. The author used AltaVista for his study because it is believed that this search engine covers a broad area of the web and provides sufficient information for webometrics studies. Jeyshankar and Babu[19], through a webometric study, examined the websites of 45 universities in Tamil Nadu. The study reflected that some universities in Tamil Nadu have higher number of web pages and some websites fall behind in their simple, self link and external link web impact factor.

Mukhopadhyay[20] studied the WIF for university websites in SAARC (South Asian Association for Regional Cooperation) countries as well as the sub domains of academic and research institutions in India. The author stated that because of the hierarchical structure of the web, WIF should be calculated at three levels and also believed that well-known search engines such as Alltheweb, AltaVista, and Hotbot can be used for data gathering and calculating WIF.

In another study, two types of websites in Australia had been compared: Australian universities websites and Australian electronic journals. Analyzing the results of the study, the author concluded that the web impact factor is an appropriate indicator to measure the general impact of large institutions such as universities and research institutes, but it is not reliable to evaluate websites with small content volume such as electronic journals[21].

Smith and Thelwall[22] studied the web impact factor for the Australian Universities websites. They used commercial search engines AltaVista and AllTheWeb as well as a specially designed crawler for calculating and comparing the web impact factor and the number of links that three countries of Australia, New Zealand and England were provided for the Australian universities websites.

The world universities are ranked based on their academic and research performance every year by some reputable centres such as the Institute of Higher Education and Shanghai Jiao Tong University (IHE-SJTU). The results of these rankings, published

annually as Academic Ranking of World Universities (ARWU) have international importance[23].

Abrizah, Noorhidawati and Kiran[24] highlighted the web performance of Asian institutional repositories through global visibility and performance of Asian top-ranked universities in the archiving and sharing their research output through institutional repositories, based on the Ranking Web of World Repositories (RWWR).

Islam and Alam[25] analysed the websites of private universities in Bangladesh according to the webometrics indicator. It examined and explored the 44 private university websites in Bangladesh and identified the number of web pages and link pages, and calculated the Overall Web Impact Factor (WIF) and Absolute Web Impact Factor (WIF). In a cross-sectional study, all the websites were analysed and compared using AltaVista search engine. The study revealed that some private universities in Bangladesh have higher number of web pages but their link pages are very small in number, thus the websites fall behind in their Overall WIF, self link, external links and Absolute WIF. While this study took into account only 44 private universities, the present study is much more comprehensive to include all universities in Bangladesh.

Objective of the study

To find the simple WIF, self link WIF and external WIF of the websites of universities in Bangladesh and rank them as per the identified indicators.

Methodology

There are 88 universities (54 private, 31 public and 3 international) in Bangladesh. The study includes all the universities of Bangladesh that have websites. Eight private and four public universities were omitted as these universities did not have a website at the time of study. Later, another two private and three public universities were also omitted as their websites were non-functional at the time of the study. Finally, 71 university websites (44 private, 24 public and 3 international universities) were selected for the study.

The 71 websites were grouped under six domain extensions as reflected from their URLs. Most of the university websites have .edu.bd (38.02 percent) extension, followed by .ac.bd (29.57 per cent) (Table 1).

Table 1—Classification of university websites in Bangladesh by domain extensions

Domain	No. of universities	Percentage
.org	05	7.04
.edu.bd	27	38.02
.ac.bd	21	29.57
.edu	13	18.30
.net	03	4.22
.info	02	2.81
Total	71	100

When undertaking WIF study, it is necessary to select a suitable search engine that will count the number of pages in the web site and the number of pages linking to the web site. Smith[21] stated that the search engines should have a large database, covering as much as of the web as possible. AltaVista search engine has been used for the reasons as pointed out by Thelwall[26], Notess[27] and Chu[28]. The data collection method extensively makes use of four special keywords and Boolean operators like domain, linkdomain, linkdomain AND domain, and linkdomain AND NOT domain. The following four search methods were used to collect data pertaining to University of Dhaka. The search was repeated for all the other universities replacing with the respective universities' URLs.

- domain: univdhaka.edu

Extracts the number of webpages at the website under www.univdhaka.edu

- linkdomain: univdhaka.edu

Reveals the number of webpages linking to the website under www. univdhaka.edu

- linkdomain:univdhaka.edu AND domain: univdhaka.edu

It provides a report of number of webpages under www.univdhaka.edu; which provides hyperlinks to website www.univdhaka.edu. This is the self links pages (links from the same website).

- univdhaka.edu AND NOT domain: univdhaka.edu

It provides the report of number of pages not under www.univdhaka.edu. It is called external link pages.

Because of the instability of the web and its content, the increasing number of web pages and also the continuous changes in the number of links, the data was gathered in a short period of time. Accordingly, the websites of universities of Bangladesh were investigated on 8 February 2011.

Analysis

Ranking based on simple WIF

Table 2 illustrates the rank distribution of universities in Bangladesh according to their simple web impact factor (SWIF). Dividing the number of link pages (B) by number of webpages (A), the SWIF for each university has been calculated. Asian University of Bangladesh occupies the first place with 96 linked pages and 4 webpages with 24 SWIF. National University and Gono Bishwabidyalay are at second and third positions. Dhaka University (4200), Daffodil International University (26200), Bangladesh University of Engineering & Technology (15200) and Islamic University of Technology (14800) have more number of webpages than the above three universities, but they are ranked 27th, 69th, 62nd and 67th respectively based on their SWIF.

Ranking based on self link WIF

The ranking of universities in Bangladesh based on their Self Link Web Impact Factor (SLWIF) is shown

Table 2—Simple Web Impact Factor for universities in Bangladesh

Sl. no.	Name of the university	NWP(A)	LWP(B)	SWIF(B/A)	Ranked by SWIF
1.	Asian University of Bangladesh	4	96	24.00	1
2.	National University	128	1450	11.33	2
3.	Gono Bishwabidyalay	6	44	7.33	3
4.	IBAIS University	56	403	7.20	4
5.	University of South Asia	13	90	6.92	5
6.	International University of Business Agriculture & Technology	194	857	4.42	6
7.	Khulna University of Engineering and Technology	228	927	4.07	7
8.	Presidency University	119	461	3.87	8
9.	Southeast University	123	378	3.07	9
10.	Leading University	39	118	3.03	10
11.	Bangladesh University	70	199	2.84	11
12.	Mawlana Bhashani Science & Technology University	52	144	2.77	12
13.	Noakhali Science & Technology University	468	1290	2.76	13
14.	Asian University for Women	466	1240	2.66	14
15.	Sylhet International University	49	129	2.63	15
16.	Central Women's University	8	20	2.50	16
17.	Rajshahi University of Engineering & Technology	203	499	2.46	17
18.	Primeasia University	53	126	2.38	18
19.	Southern University of Bangladesh	130	295	2.27	19
20.	Manarat International University	116	260	2.24	20
21.	Queens University	25	53	2.12	21
22.	Bangladesh Open University	164	338	2.06	22
23.	Ahsanullah University of Science and Technology	772	1590	2.06	23
24.	American Bangladesh University	1	2	2.00	24
25.	ASA University Bangladesh	154	285	1.85	25
26.	The University of Asia Pacific	527	970	1.84	26
27.	Dhaka University	4020	7220	1.80	27
28.	Jatiya Kabi Kazi Nazrul Islam University	52	91	1.75	28
29.	BRAC University	2740	4660	1.70	29
30.	Bangabandhu Sheikh Mujib Medical University	332	534	1.61	30
31.	Green University of Bangladesh	97	156	1.61	31

Contd—

Table 2—Simple Web Impact Factor for universities in Bangladesh

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Sl. no.	Name of the university	NWP(A)	LWP(B)	SWIF(B/A)	Ranked by SWIF
32.	Bangladesh Agricultural University	477	736	1.54	32
33.	Eastern University	70	103	1.47	33
34.	Dhaka University of Engineering & Technology	405	554	1.37	34
35.	University of Information Technology & Sciences	332	451	1.36	35
36.	Bangladesh University of Professionals	218	292	1.34	36
37.	University of Development Alternative	73	98	1.34	37
38.	University of Chittagong	537	706	1.31	38
39.	State University Of Bangladesh	111	144	1.30	39
40.	World University of Bangladesh	230	300	1.30	40
41.	Jagannath University	131	164	1.25	41
42.	Dhaka International University	101	123	1.22	42
43.	Bangladesh University of Business & Technology (BUBT)	145	174	1.20	43
44.	University of Science & Technology, Chittagong	38	45	1.18	44
45.	American International University Bangladesh	2700	2990	1.11	45
46.	East Delta University	61	68	1.11	46
47.	Independent University, Bangladesh	1420	1570	1.11	47
48.	South Asian University	114	125	1.10	48
49.	Metropolitan University	134	146	1.09	49
50.	Khulna University	586	617	1.05	50
51.	Jahangirnagar University	1600	1650	1.03	51
52.	Stamford University, Bangladesh	196	189	0.96	52
53.	Chittagong University of Engineering & Technology	1410	1330	0.94	53
54.	Shahjalal University of Science & Technology	2150	2020	0.94	54
55.	Chittagong Veterinary and Animal Sciences University	90	83	0.92	55
56.	Rajshahi University	4020	3550	0.88	56
57.	Prime University	42	33	0.79	57
58.	International Islamic University, Chittagong	987	741	0.75	58
59.	Patuakhali Science And Technology University	177	131	0.74	59
60.	Darul Ihsan University	168	108	0.64	60
61.	East West University	5320	2900	0.55	61
62.	Bangladesh University of Engineering & Technology	15,200	8060	0.53	62
63.	North South University	5520	2770	0.50	63
64.	Premier University, Chittagong	210	88	0.42	64
65.	United International University	2500	945	0.38	65
66.	Northern University Bangladesh	2640	910	0.34	66
67.	Islamic University of Technology	14800	4430	0.30	67
68.	University of Liberal Arts Bangladesh	2920	553	0.18	68
69.	Daffodil International University	26200	3030	0.12	69
70.	Islamic University	0	47	0.00	70
71.	Sher-e-Bangla Agricultural University	0	49	0.00	71

Note: NWP-Number of web pages; LWP-Number of linked web pages; SWIF-Simple Web Impact Factor

in the Table 3. Central Women's University occupies the first place with 8 self link pages and 8 web pages with 1 LWIF. American Bangladesh University, Manarat International University and Mawlana Bhashani Science & Technology University are ranked at 2nd, 3rd and 4th with SLWIF of 1, 0.96 and 0.94 respectively. Though Daffodil International University has more number of web pages than all the other universities, it occupies the 66th position because the number of self link pages is very less (3660) compared to its web pages, and its SLWIF is 0.14. Furthermore, Bangladesh University of

Table 3—Self-link Web Impact Factor for universities in Bangladesh

Sl. no.	Name of the university	NWP(A)	SLWP(C)	SLWIF(C/A)	Ranked by SLWIF
1.	Central Women's University	8	8	1.00	1
2.	American Bangladesh University	1	1	1.00	2
3.	Manarat International University	116	111	0.96	3
4.	Mawlana Bhashani Science & Technology University	52	49	0.94	4
5.	Rajshahi University of Engineering & Technology	203	178	0.88	5
6.	Queens University	25	22	0.88	6
7.	Bangladesh Agricultural University	477	377	0.79	7
8.	University of Development Alternative	73	55	0.75	8
9.	IBAIS University	56	41	0.73	9
10.	East Delta University	61	44	0.72	10
11.	Bangladesh University	70	49	0.70	11
12.	Darul Ihsan University	168	118	0.70	12
13.	Patuakhali Science And Technology University	177	123	0.69	13
14.	Southern University of Bangladesh	130	89	0.68	14
15.	Leading University	39	26	0.67	15
16.	International University of Business Agriculture & Technology	194	118	0.61	16
17.	State University Of Bangladesh	111	66	0.59	17
18.	Chittagong Veterinary and Animal Sciences University	90	52	0.58	18
19.	Asian University for Women	466	261	0.56	19
20.	Jahangirnagar University	1600	877	0.55	20
21.	American International University Bangladesh	2700	1470	0.54	21
22.	United International University	2500	1360	0.54	22
23.	University of Science & Technology, Chittagong	38	20	0.53	23
24.	Chittagong University of Engineering & Technology	1410	741	0.53	24
25.	Independent University, Bangladesh	1420	745	0.52	25
26.	Noakhali Science & Technology University	468	233	0.50	26
27.	University of Information Technology & Sciences	332	166	0.50	27
28.	South Asian University	114	57	0.50	28
29.	Premier University, Chittagong	210	105	0.50	29
30.	Southeast University	123	59	0.48	30
31.	East West University	5320	2570	0.48	31
32.	The University of Asia Pacific	527	250	0.47	32
33.	Eastern University	70	33	0.47	33
34.	Dhaka International University	101	47	0.47	34
35.	University of South Asia	13	6	0.46	35
36.	Islamic University of Technology	14800	6740	0.46	36
37.	Rajshahi University	4020	1670	0.42	37
38.	University of Liberal Arts Bangladesh	2920	1160	0.40	38
39.	World University of Bangladesh	230	92	0.40	39
40.	Stamford University, Bangladesh	196	76	0.39	40
41.	Sylhet International University	49	18	0.37	41
42.	Prime University	42	15	0.36	42
43.	ASA University Bangladesh	154	54	0.35	43
44.	North South University	5520	1890	0.34	44
45.	BRAC University	2740	876	0.32	45
46.	Bangladesh University of Business & Technology (BUBT)	145	47	0.32	46
47.	Presidency University	119	36	0.30	47

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Table 3—Self-link Web Impact Factor for universities in Bangladesh

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Sl. no.	Name of the university	NWP(A)	SLWP(C)	SLWIF(C/A)	Ranked by SLWIF
48.	Primeasia University	53	15	0.28	49
49.	Ahsanullah University of Science and Technology	772	201	0.26	50
50.	Khulna University	586	153	0.26	51
51.	International Islamic University, Chittagong	987	254	0.26	52
52.	Bangladesh University of Engineering & Technology	15,200	3990	0.26	53
53.	Asian University of Bangladesh	4	1	0.25	54
54.	Khulna University of Engineering and Technology	228	57	0.25	55
55.	Bangabandhu Sheikh Mujib Medical University	332	73	0.22	56
56.	Dhaka University of Engineering & Technology	405	91	0.22	57
57.	Bangladesh University of Professionals	218	48	0.22	58
58.	Shahjalal University of Science & Technology	2150	480	0.22	59
59.	Jatiya Kabi Kazi Nazrul Islam University	52	11	0.21	60
60.	Gono Bishwabidyalay	6	1	0.17	61
61.	University of Chittagong	537	88	0.16	62
62.	Northern University Bangladesh	2640	427	0.16	63
63.	Bangladesh Open University	164	24	0.15	64
64.	National University	128	18	0.14	65
65.	Daffodil International University	26200	3660	0.14	66
66.	Green University of Bangladesh	97	11	0.11	67
67.	Jagannath University	131	2	0.02	68
68.	Metropolitan University	134	1	0.01	69
69.	Islamic University	0	0	0.00	70
70.	Sher-e-Bangla Agricultural University	0	0	0.00	71

Note: NWP-Number of web pages, Number of Self-linked web pages, SWIF-Self-linked Web Impact Factor

Engineering and Technology (BUET) and Islamic University of Technology University occupies lower position with SLWIF as 0.26 and 0.14 respectively.

Ranking based on external WIF

Table 4 shows the distribution of universities in Bangladesh according to their external link WIF (ELWIF). Mawlana Bhashani Science & Technology University occupies the first place with 52 with ELWIF 0.54. Jahangirnagar University is in the 2nd position with ELWIF 0.53. Southern University of Bangladesh, University of Information Technology & Sciences and IBAIS University were ranked 3rd, 4th and 5th with ELWIF 0.46, 0.42 and 0.34 respectively.

Discussion

The present study chose Alta Vista because of its ability to cover a broader range of the web as opposed to the other commercial search engines. Moreover, some essential data could not be retrieved via other popular search engine like Google, Yahoo and Live Search at the time of the study. It is reported that these websites could not process some of the main queries useful for webometric purposes[29]. AltaVista search engine indexes 4 web pages on the Asian University of Bangladesh website at the time of the study. These pages in general received 96 linked webpages from which 1 was external. Since the WIF is calculated by dividing the number of inlinks to the number of web pages, it will be falsely high for the new websites with few web pages. Therefore, the website of Asian University of Bangladesh with only 4 web pages placed at the top of total universities in Bangladesh. The WIF of Asian University of Bangladesh was 24.00. It is obvious that major universities in Bangladesh such as Dhaka University, Bangladesh University of Engineering and Technology, BRAC University, American International University, Bangladesh, East West

Table 4—External -link Web Impact Factor for universities in Bangladesh

Sl. no.	Name of the university	NWP(A)	ELWP(D)	ELWIF(D/A)	Ranked by ELWIF
1.	Mawlana Bhashani Science & Technology University	52	28	0.54	1
2.	Jahangirnagar University	1600	852	0.53	2
3.	Southern University of Bangladesh	130	60	0.46	3
4.	University of Information Technology & Sciences	332	140	0.42	4
5.	IBAIS University	56	19	0.34	5
6.	Islamic University of Technology	14800	3840	0.26	6
7.	East Delta University	61	15	0.25	7
8.	Asian University of Bangladesh	4	1	0.25	8
9.	South Asian University	114	19	0.17	9
10.	International University of Business Agriculture & Technology	194	29	0.15	10
11.	University of Development Alternative	73	10	0.14	11
12.	Asian University for Women	466	65	0.14	12
13.	Prime University	42	6	0.14	13
14.	International Islamic University, Chittagong	987	122	0.12	14
15.	Southeast University	123	13	0.11	15
16.	American International University Bangladesh	2700	260	0.10	16
17.	ASA University Bangladesh	154	15	0.10	17
18.	Independent University, Bangladesh	1420	122	0.09	18
19.	BRAC University	2740	257	0.09	19
20.	Manarat International University	116	9	0.08	20
21.	Bangladesh Agricultural University	477	39	0.08	21
22.	Darul Ihsan University	168	14	0.08	22
23.	Patuakhali Science And Technology University	177	15	0.08	23
24.	Leading University	39	3	0.08	24
25.	United International University	2500	205	0.08	25
26.	University of South Asia	13	1	0.08	26
27.	Presidency University	119	10	0.08	27
28.	Premier University, Chittagong	210	15	0.07	28
29.	Stamford University, Bangladesh	196	13	0.07	29
30.	Dhaka University of Engineering & Technology	405	28	0.07	30
31.	State University Of Bangladesh	111	7	0.06	31
32.	Eastern University	70	4	0.06	32
33.	Rajshahi University	4020	230	0.06	33
34.	Bangladesh University of Business & Technology (BUBT)	145	9	0.06	34
35.	Rajshahi University of Engineering & Technology	203	11	0.05	35
36.	University of Liberal Arts Bangladesh	2920	144	0.05	36
37.	Queens University	25	1	0.04	37
38.	East West University	5320	226	0.04	38
39.	The University of Asia Pacific	527	20	0.04	39
40.	Dhaka International University	101	4	0.04	40
41.	Sylhet International University	49	2	0.04	41
42.	Dhaka University	4020	162	0.04	42
43.	Bangladesh University of Engineering & Technology	15,200	580	0.04	43
44.	Khulna University of Engineering and Technology	228	9	0.04	44
45.	Daffodil International University	26200	1140	0.04	45
46.	Bangladesh University	70	2	0.03	46

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Table 4—External -link Web Impact Factor for universities in Bangladesh

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Sl. no.	Name of the university	NWP(A)	ELWP(D)	ELWIF(D/A)	Ranked by ELWIF
47.	Noakhali Science & Technology University	468	14	0.03	48
48.	World University of Bangladesh	230	6	0.03	49
49.	Ahsanullah University of Science and Technology	772	23	0.03	50
50.	Khulna University	586	15	0.03	51
51.	Bangladesh University of Professionals	218	7	0.03	52
52.	Shahjalal University of Science & Technology	2150	59	0.03	53
53.	Green University of Bangladesh	97	3	0.03	54
54.	Chittagong Veterinary and Animal Sciences University	90	2	0.02	55
55.	North South University	5520	87	0.02	56
56.	Bangabandhu Sheikh Mujib Medical University	332	5	0.02	57
57.	University of Chittagong	537	09	0.02	58
58.	Northern University Bangladesh	2640	62	0.02	59
59.	Bangladesh Open University	164	4	0.02	60
60.	National University	128	2	0.02	61
61.	Central Women's University	8	0	0.00	62
62.	American Bangladesh University	1	0	0.00	63
63.	University of Science & Technology, Chittagong	38	0	0.00	64
64.	Primeasia University	53	0	0.00	65
65.	Jatiya Kabi Kazi Nazrul Islam University	52	0	0.00	66
66.	Gono Bishwabidyalay	6	0	0.00	67
67.	Jagannath University	131	0	0.00	68
68.	Metropolitan University	134	0	0.00	69
69.	Islamic University	0	0	0.00	70
70.	Sher-e-Bangla Agricultural University	0	0	0.00	71

Note: NWP-Number of web pages, Number of External- linked web pages, ELWIF-External-linked Web Impact Factor

University, Daffodil International University and Rajshahi University with thousands of web pages have more effective presence on the internet. The reports of the Webometrics ranking of world universities confirm the higher position of these universities in their ranking[30]. Thelwall[31] believes that calculating WIF of a domain by AltaVista can be precise enough if the number of web pages in the website is relatively high.

Thewall[26] studied 100 universities website of the UK and the results of his research showed that the most highly linked to pages are those that facilitate access to a wide range of information. Other researchers also discussed that websites which provided non-English web pages attracted less visitors and received less inlinks and therefore got lower WIFs[32].

Problems of webometrics ranking of the universities in Bangladesh

Universities of Bangladesh are not known at the international level and as per the webometrics indicators their websites are ranked very low. According to the Ranking Web of World Universities[24], Bangladesh University of Engineering and Technology (BUET) was at the 26th position in top 100 South Asian universities and in Bangladesh it is the best among all public and private universities. However, global ranks of some universities in Bangladesh are low. None of the universities in Bangladesh were among the top 100 universities in Asia.

The policy makers of the universities in Bangladesh and also the managers of their websites are not paying

more attention to their work. They are not familiar with the webometrics study and benefits of improving web ranking. Almost all the universities in Bangladesh are using ICT for managing the administrative processes and some are using ICT not to a large extent but at a moderate level[33]. As they are not oriented with this system, they do not make the websites active and rich in a way so as to be attractive.

Some other reasons for the lower presence of the universities in Bangladesh on the web are as follows: structural problems in web designing, providing few English web pages, limitation of access to the scientific resources, not indexing most of the universities in Bangladesh by major search engines and web directories, the instability of their web servers, inefficient web designs and lack of institutional repositories.

Recommendations

As the universities of Bangladesh do not have greater web visibility, these universities need to focus on the following issues to increase the visibility of their websites. These are:

1. Building awareness is important as it will help improve the visibility of the resources of the universities. Updating webpages of the faculty members with hyperlinks will improve the ranking of the universities. Universities should provide some space for the faculty members and researchers.

2. Providing a site map for the university website that will help search engines to index all the centers related to the institute such as institutes, faculties, program, research centers etc.

3. It is our finding that more than 22 Bangladeshi universities are having less than 100 web pages; therefore, they may not qualify for comparative webometric studies, especially for ranking purposes, due to underdeveloped websites. These university websites should be developed and linked to more and more web pages and other contents.

4. Universities need to set priorities and allocate resources among academic disciplines and research fields which can help improve their rank.

5. The webmasters of university websites in Bangladesh need to find useful information such as Open Access (OA) resources to increase the richness of the website content. It is generally thought that good ranks are correlated with higher number of potential authors (scholars and postgraduates) who self-archive. It would also strengthen the effort made by the academic library to collect and disseminate the university's intellectual output.

6. To increase visibility and the number of in-links, websites should provide their contents in English, because English is the most commonly used language on the Web.

7. University Grants Commission need to introduce ranking systems for the universities in Bangladesh. As a result, it will promote the universities to acquire good position in UGC ranking.

Conclusion

Link analysis of the websites of universities in Bangladesh is an unexplored area of webometric research. This study gives a fair idea about the information provided by the websites of the 71 universities of Bangladesh. Overall, it can be said that considering the benefits that can be extracted from the university websites of Bangladesh, more webometric studies need to be conducted. Greater participation from Bangladeshi top ranked universities is expected to lead the way. This study has been exploratory and there is a scope for future webometric research in this area. It would be useful to carry out a more comprehensive study covering more institutions and comparing web with conventional publication output and indicators of economic and technological development. This study reflects that universities in Bangladesh have higher number of web pages but correspondingly their link pages are very small in number, and the websites fall behind in their overall, self-link and external web impact factors.

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