

Webometric Analysis of National Libraries Websites

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Abstract. Webometric analysis of 181 national libraries' websites has been conducted in the context of this research. A Global Rank of 136 national libraries' websites has been organized. Their key traffic metrics have been analyzed and the Internet segments where they could be found have been identified. The analysis of websites' traffic channels that are direct, referral, search traffic, social media traffic, mailing lists and banner advertising traffic has been performed. The conclusion has been made about the successful integration of library content into the web environment, the gradual development of the web reputation and trust rank of the websites of particular libraries. The emphasis has been made on the possible use of the data obtained to develop approaches and algorithms for optimization, security improvement and efficient resource functioning of libraries that are multiservice social communication institutions with high access.

Keywords: National Libraries, National Libraries' Websites, Webometrics.

1 Introduction

Digitization of library resources traces roots back to integration of library and information environment into digital media environment and updating the library's resource base. However, in different countries these processes do not coincide in terms of implementation and are associated with a nationwide hierarchy of values, recognition of the library social status in practice. Not only the country's attitude towards digitization at the first stage of informatization, its ability to create and implement the informatization concepts, social integration, intellectualization of the society, but the effectiveness of implementation of the national library and information science policy have the impact on the digitization of library resources. The research results of webometric analysis of the national libraries' websites of the world countries that differ in the level of socio-economic and technical-technological development and the

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state of Library and Information Science development present the main tendencies of digitization of library resources.

2 Related Works

Theoretical foundation of libraries' future development in digital realities are present in numerous scientific works of Library and Information Science researchers and practitioners: O. Voskoboinikova-Guzeva, T. Granchak, I. Davydova, V. Ilganaeva, O. Kobelev, V. Kopaneva, K. Lobuzina, A. Peleshchyshyn, O. Mastykh, A. Solianyk, D. Solovianenko, G. Shemaeva and others. At the same time, research on the functioning of libraries' web-based resources raises a considerable amount of questions that are related not only to creation of the websites but also their optimization. In particular, relevant scientific works of A. Strungar, V. Strungar, S. Nazarovets and others are of great current interest.

The present research complements the previously conducted analysis on the current state of library web content accessibility based on the principles of Web Content Accessibility Guidelines 2.0 (2008) and Web Content Accessibility Guidelines 2.1 (2018) [3]. The scope of which was to check 177 websites of national libraries from around the world for compliance with WCAG 2.0 guidelines. 151 websites have been successfully checked with the use of Achecker service. 29 websites (19%) were fully compliant, 3 websites were partially compliant, and 119 websites did not meet WCAG 2.0 accessibility guidelines at A, AA and AAA levels [3].

3 Methodology

SimilarWeb (www.similarweb.com) has been chosen as the analytical tool for researching 181 national libraries' websites. SimilarWeb functionality makes it possible to analyze and compare key metrics of library website traffic, monthly traffic, pages per visit and visit duration. SimilarWeb allows to place traffic channels in the context of direct, referral and search traffic, to estimate social media traffic, mailing lists and banner advertising traffic and to establish links of library's websites to their partners and similar resources.

The result of the research is the relative rank of 136 national libraries' websites. It should be pointed out that among the 181 analyzed websites, the libraries whose global rank was not possible to identify by Similarweb portal (though other indicators of their functionality were obtained) were not included into this rating. In particular, these are the websites of National Libraries of Malta, Mexico, Ecuador, Botswana, Puerto Rico. In addition, the metrics of 35 websites were not obtained as they were located in the domain of other institutions (government organizations, corporate digital libraries) or the resources were irrelevant at the time of the research.

4 Results

Webometric analysis of the websites made it possible to organize a Global Rank of 136 national libraries' websites (Table 1). Comparison of the obtained data on search traffic allows to claim that the digital library archives that hold the leading positions are the archives of the countries that have already entered the information society and actively use its multidimensional evolution of knowledge paradigm, as well as recognize the growing role of information, knowledge and digital infrastructure in all spheres of society functioning. The results of the analysis confirm the consistent pattern of permanent use of Library and Information Science digital resource bases in the countries that have the standard pattern of those bases. In particular, this is verified by the popularity rate of national libraries' websites of the following countries: the USA, France, Japan, Australia, Taiwan, Italy, Great Britain, Luxembourg etc.

Table 1. Global Rank of world's national libraries' websites

Sl. No	Library	Global Rank	Sl. No	Library	Global Rank
1	The Library of Congress	8167	69	The National Library of Latvia	822773
2	The Vatican Apostolic Library	10188	70	The National Library of Romania	872939
3	The Bibliothèque Nationale de France	12000	71	Macau Public Library	878233
4	The National Diet Library (Japan)	15974	72	The Biblioteca Nacional de Uruguay	1029171
5	The National Library of Luxembourg	20809	73	The National Library of South Africa	1069931
6	The National and University Library (Slovenia)	20839	74	The National Library of Mongolia	1108134
7	The National Library of Australia	25097	75	The National Library and Information System of Trinidad and Tobago	1108134
8	The National Central Library (Taiwan)	26355	76	Bandar Seri Begawan Library (Brunei Darussalam)	1112837
9	The British Library (Great Britain)	26872	77	The King Fahad National Library (Saudi Arabia)	1276093
10	The National Library Service of Italy	30868	78	The Nepal National Library	1325060
11	Library and Archives Canada	32105	79	The Andorra National Library	1355527
12	The National Széchényi Library	40237	80	The Biblioteca Nacional Pedro	1407470

Sl. No	Library	Global Rank	Sl. No	Library	Global Rank
	(Hungary)			Henríquez Ureña (Dominican Republic)	
13	The National Library of Scotland	44307	81	The National Library of Jordan	1412489
14	The Royal Library (Denmark)	46770	82	The National Library of Paraguay	1533262
15	The National Library of Norway	51560	83	National Library and Documentation Services Board of Sri Lanka	1542319
16	The National Library of Korea	53591	84	The National Library of Estonia	1542702
17	The Swiss National Library (Switzerland)	53831	85	Slovak National Library (Slovakia)	1612751
18	The National Library of Singapore	53948	86	The National Library of Kuwait	1752422
19	The National Parliamentary Library of Georgia	70362	87	Cyril and Methodius National Library of Bulgaria	1756175
20	The Biblioteca Nacional de España (Spain)	70953	88	The National Library of Indonesia	2054939
21	The National Library of Israel	72636	89	The Biblioteca Nacional de Venezuela	2224001
22	The Royal Library of the Netherlands	96660	90	The National Library of Pakistan	2237681
23	National Library of Sweden	97529	91	The National Library of Tunisia	2348629
24	The German National Library	106760	92	The Kenya National Library Service	2458441
25	The National Library of New Zealand	111492	93	The Kenya National Library Service	2458441
26	The National Library of Russia	112470	94	The National Library of the Kyrgyz Republic	2637033
27	The Austrian National Library	125957	95	The National and University Library of Iceland	2783848
28	The National Library of Azerbaijan	128893	96	The National Library of Bangladesh	2882525
29	The National Library of the Czech Republic	137135	97	The Lebanese National Library	3235215

Sl. No	Library	Global Rank	Sl. No	Library	Global Rank
30	The Vernadsky National Library of Ukraine	162620	98	Al-Assad National Library (Syria)	3352621
31	The National Library of Ireland	162699	99	The National Library of Liechtenstein	3879945
32	The National Library of Greece	172516	100	The National Library of Uganda	4030583
33	Biblioteca Nazionale Centrale (Italy)	182790	101	The Louis Notari Library (Monaco)	4120639
34	The National and University Library in Zagreb (Croatia)	186776	102	National and University Library "St. Kliment of Ohrid" (Macedonia)	4166311
35	The National Library of Iran	190175	103	The Bermuda National Library	4245981
36	The National Library of Serbia	191741	104	The National Library of Aruba	4282063
37	The National Library of Turkey	195722	105	The Bahamas National Library	4297577
38	The National Library of Belarus	198993	106	The National Library of Nigeria	4457934
39	The National Library of Canada	214198	107	The National and University Library of Bosnia and Herzegovina	4597552
40	The National Library of the Kingdom of Morocco	222376	108	The Biblioteca Nacional de Chile (Chile)	5351877
41	Qatar National Library	225686	109	The Public and National Library of Greenland	6101351
42	The Biblioteca Nacional do Brasil (Brazil)	239900	110	The National Library of Montenegro "Đurđe Crnojević"	6130518
43	The National Library of Uzbekistan	241986	111	The Egyptian National Library and Archives	6554712
44	The National Library of Jamaica	241986	112	The National Library of El Salvador	6591602
45	The National Library of Poland	249166	113	The National Library of Bhutan	7101949
46	The National Library of Finland	304851	114	The National Library of the Faroe Islands	7136176
46	The National Library of Vietnam	325468	115	The Antigua Public Library (Antigua and Barbuda)	8032099
48	The National Library of Colombia	341001	116	Public and National Library of Greenland	8443746

Sl. No	Library	Global Rank	Sl. No	Library	Global Rank
49	The Royal Library of Belgium	412137	117	The National Library of Côte d'Ivoire	9014738
50	The National Library of Peru	412872	118	The National Library of Malaysia	9209345
51	University of Zambia Library	428626	119	The Cyprus Library (the Republic of Cyprus)	9284892
52	The National Library of Armenia	439308	120	The National Library of Senegal	10478622
53	The Mariano Moreno National Library of the Argentine Republic	457589	121	The National Library of the Republic of the Maldives	10880143
54	The Biblioteca Nacional de Panamá (Panamá)	459768	122	The National Library Service of Belize	11162655
55	The National Library of Tajikistan	475390	123	The National Library of Cape Verde	11456743
56	The National Library of Wales	524201	124	The National Archive and Library of Bolivia	12178957
57	The National Library of Thailand	561899	125	The National Library Service of Malawi	13695330
58	The National Library of India	565831	125	The National Library and Archives of Grenada	13703287
59	The National Library José Martí (Cuba)	573804	127	The National Library of Algeria	14420689
60	The Biblioteca Nacional de Portugal (Portugal)	585398	128	The National Central Library (Tanzania)	14710077
61	The National Library of China	585913	129	Nationale database Suriname	19011334
62	The National Library of Northern Cyprus	605979	130	The Bibliothèque nationale du Gabon (Gabon)	24556885
63	The National Library of the Philippines	682707	131	The National Archives and Library of Ethiopia	26331466
64	The National Library of the Republic of Moldova	717336	132	The National Library of Cambodia	26895919
65	The National Library of Albania	780653	133	The National Library of Vanuatu	27243844

Sl. No	Library	Global Rank	Sl. No	Library	Global Rank
66	The National Library of Ecuador	804533	134	The National Library of Laos	28283752
67	The National Library of the Republic of Kazakhstan	805359	135	I.G. Papaskir National Library of the Republic of Abkhazia	31996495
68	Martynas Mažvydas National Library of Lithuania	820448	136	The National Library of Nicaragua Rubén Darío	36834232

The metrics of 121 out of 181 national libraries' websites show that they could be found in different Internet segments (Similarweb lists 25 categories and 125 sub-categories). The biggest number of national libraries' websites are in the «Libraries and Museums» category. For instance, The Bibliothèque Nationale de France (the National Library of France) is on the 9th position in the Top Websites Ranking (50 websites are in this category), The National Diet Library (the National Library of Japan) is on the 20th position, The British Library (the National Library of Great Britain) is on the 30th position, The National Central Library (the National Library of Taiwan) is on the 38th position, the National Library of Canada (Quebec) - 43d position, the National Library of Norway - 49th. These are the other Internet segments where library resources could be found: «Government», «Law and Government», «Arts and Entertainment», «Education», «Business and Industry», «People and Society», «Community and Society», «Universities and Colleges», «Marketing and Advertising», «Programming», «Internet and Telecom», «Archives», «News and Media», «Dictionaries and Encyclopedias», «Folklore» and even «Sports» (Fig.1.). The website of the Vernadsky National Library of Ukraine is the only national library resource that is in the Books and Literature segment.

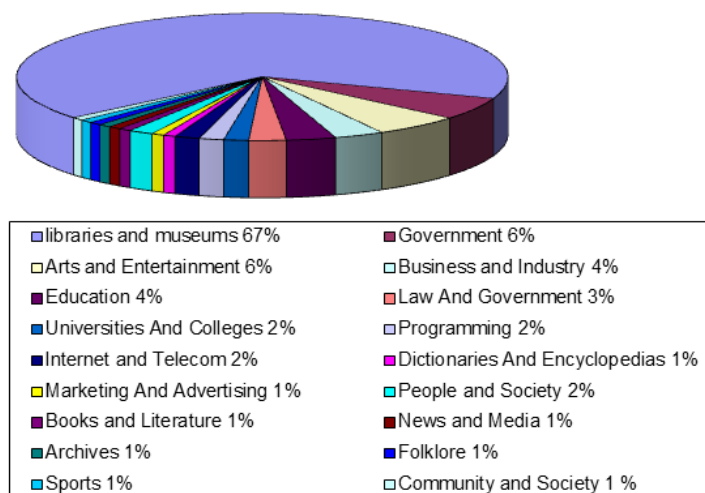


Fig. 1. The categories of the Internet segments where national libraries' websites are found (according to SimilarWeb)

Other criteria for ranking the national libraries' websites are the following: Traffic by countries; Average Visit Duration; Pages per Visit; Bounce Rate. National libraries' websites with the highest traffic metrics are listed in Table 2.

Table 2. National libraries' websites with the highest traffic metrics (according to Similarweb, March, 2020)

Library	Average Visit Duration	Pages per Visit
The National Library of the Czech Republic	00:26:46	19.85
The Austrian National Library	00:14:51	18.76
The National Library of Finland	00:12:24	14.84
The National Library of Ireland	00:11:16	55.58
The National Library of Norway	00:10:24	28.22
The National Library of Scotland	00:09:23	35.38
The National Library and Archives of Quebec	00:08:53	12.94
The National Library of Greece	00:07:32	10.46
The Royal Library in Copenhagen	00:07:20	10.98
The National Central Library (Taiwan)	00:06:04	7.69

The website of the National Library of China with a daily visit duration of 00:00:29 hours and 2.22 pages per user has the lowest traffic. For comparison, the average time spent on a website of a national library is 00:03:12 hours, the average pages per visit is 3.9 pages per user. These figures show the room for growth for the website of the Vernadsky National Library of Ukraine, which visit duration is currently 00:1:17 hours and average pages per visit is 1.62 pages per user.

The lowest Bounce Rate - the percentage of visitors who leave the website immediately after visiting it or view no more than one page of it – have the following websites: the National Library of Denmark – 25.74%, the National Library of Canada (Quebec) – 29.40%, the National Library of Norway – 31.83%, the National Library of Scotland – 34.81%, the National Library of Austria – 33.26%, the National Library of South Korea – 33.95%, the Royal Library of the Netherlands – 35.52%. The highest Bounce Rate figures have been found on the websites of: the Vernadsky National Library of Ukraine – 80.37%, the National Parliamentary Library of Georgia – 69.82%, the National Library of Azerbaijan – 69.27%, the National Library of Italy (Florence) – 68.80%, the National Library of Croatia – 68, 21%, the National Library of Japan – 65,43%.

Analysis of the traffic channels of the national libraries' websites has revealed that the majority of visitors come from the search engine websites – the average number is 35%, while the direct domain number is 22.7% and the referrals number is 15.7%.

The research results allow us to determine that most of the users visit the websites of the national libraries from the following resources: Wikipedia.org, Wiki, web search engine Google.com, WorldCat.org directory, EBSCO.com portal, digital libraries, e-learning Moodle platform and a variety of blogging platforms. In particular, the largest number of the national libraries' website visits is from Wikipedia.org. The above mentioned is supported by the figures of 66 websites' traffic out of 181. 26 websites of national libraries, including the Library of Congress, the National Libraries of France, Japan, Australia, Taiwan, Great Britain, Hungary, Scotland, Denmark, Singapore, the Netherlands etc. have Display Advertising.

The social media traffic of the national libraries' websites includes 26 different forms of social media (Fig. 2.). Most national libraries have been using social media for several years for outreach, marketing and advertising purposes. Their promotion in social media becomes vital from the point of view of balancing the creation and implementation of library products and services and their acceptance by users. Webometric research of national libraries' websites proves that social media is indeed an effective communication and marketing channel for promoting libraries' web projects. So 96 websites out of the 136 analysed by Similarweb had Social media traffic. The users of these websites most often visit the sites from different forms of social media. They are well-known universal social media channels like Facebook, Instagram, Renren, Douban, Odnoklassniki, Vkontakte; professional social media channels: LinkedIn; scientific ones: ResearchGate, Academia; microblogging: Twitter, Plurk, Sina Weibo; video, photo and slide hosting ones: Youtube, Flickr, Pinterest, Slideshare, Dailymotion; cloud services: Scribd, SoundCloud; crowdsourcing hosting Wikia; the social news website Reddit; bookmarking services: Hatena Bookmark, Pocket; online music catalog Last.fm; programming questions and answers: Stack Overflow; and WhatsApp Webapp, Telegram messengers.

It should be noted that users visit the libraries' websites both from social media, where the official accounts of library institutions have already been set up, and from the services where the promotion of the latter haven't taken place yet. Moreover, some national libraries do not have their own website or their official resources have been irrelevant for a long time, and they only have social media channels to represent them on the Internet. For example, the National Library and Archives of Tuvalu, which, in the absence of the website, has an official Facebook account and has 1,435 subscribers (1379 likes).

The popularity of mobile technology has drawn attention of national libraries to design and develop mobile applications to focus on "connecting" users to digital library assets. Libraries that have powerful digital assets and a wide range of information products and services for different user categories develop mobile applications. According to the research results, only 12% of national libraries have mobile applications (Fig. 3).

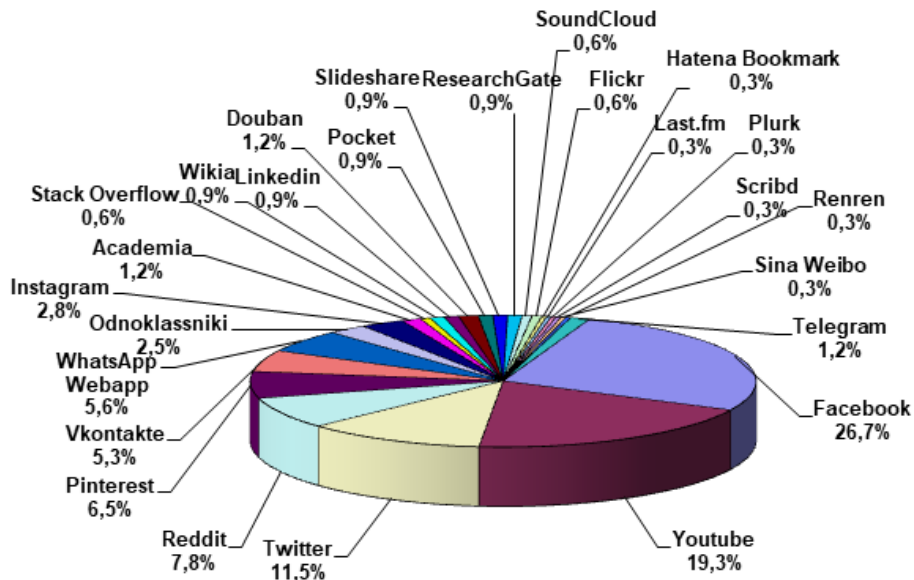


Fig. 2. Social media traffic of 96 national libraries' websites

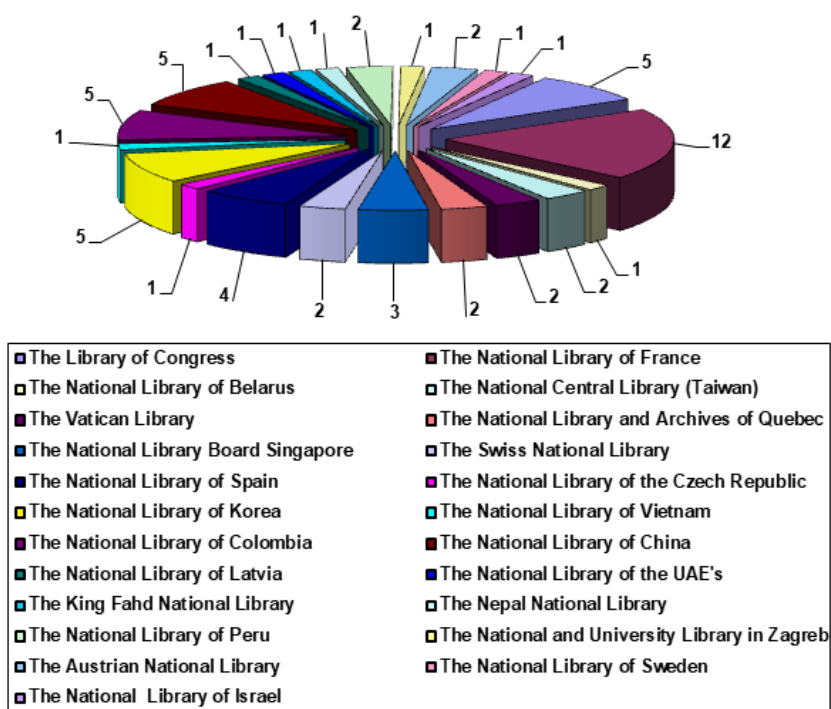


Fig. 3. Mobile applications of the national libraries

The Bibliothèque Nationale de France (the National Library of France) has 12 applications that is the largest number of applications; four libraries have 5 mobile applications; one - 4 applications, The National Library in Singapore - 3; 6 libraries have developed 2 applications; 10 libraries have 1 application each. Mobile applications are available on the libraries' websites, Google Play or the App Store, they are free and target a wide audience.

5 Conclusions and Future Works

It should be pointed out that the research results are theoretical and relative taking into account high variability of the web environment and the fact that no mechanism for collecting and analyzing website statistics makes it possible to obtain perfectly accurate metrics. In addition, the technical implementation of national libraries' websites is sometimes fundamentally different. Some of them are advanced portals; others are websites with a minimum number of pages and features.

Website storage, total number and the format of features, content characteristics are all in direct ratio to the number of direct and referral traffic of the website, pages per view, bounce rate and other metrics. However, the research results allow us to find out the main trends of the national libraries' website development. The websites that are correctly set up and optimized according to the latest trends of technologies development have high traffic. Website's visit duration metrics, pages per view, data of the relevance and website promotion in various geographical regions show a wide range and the core or the pull of regular users.

Data of the direct and referral traffic, website's position in the categories, rankings, search engines and social media traffic indicate the successful integration of libraries' content into the web environment, identification of the most required resources of libraries and future development directions, gradual development of websites' reputation of particular libraries.

Further detailed research on the structure and features of the websites' traffic can be the basis for the development of approaches and algorithms for optimization, security communication institutions with high access.

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