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# Web visibility and impact of the National libraries in Sub-Saharan Africa<sup>1</sup>

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## Abstract

*National libraries (NLs) play an important role not only in the preservation of the national heritage but also in the provision of information to a country's population. It is therefore very important that, with the emergence of information and communication technologies such as the Internet, the libraries are not rendered useless. The paper explores the status of the libraries on the Web in terms of their visibility, impact and linkages by investigating their search traffic statistics using the Alexa search tool. Results indicate that almost half of the NLs in sub-Saharan Africa do not have their own websites; although the high impact and top search queries were subject/issue-oriented, some of the search queries were not subject-specific; and majority of the in-links emanated from Wikis as well as library-oriented websites. The study concludes that national libraries in sub-Saharan Africa are not widely visible on the Web while their impact on the Web is minimal. The use of social networking sites as a means of improving the Web visibility and impact of the libraries is recommended.*

## Introduction

Will national libraries have any role in the age of the Internet? Will they shrink or expand? Or will their functions become obsolete or be taken over by other bodies? Are national libraries needed anyway? (Line 1998).

The research problem for this study was based on the aforementioned concerns posed by Line in 1998 (Line, 1998). It is believed that Line is not alone as several librarians and policy makers on matters concerning libraries and librarianship have raised similar concerns. For instance, Richard (2009) observes that “since attending the 70th APLA conference in Halifax this June, I have been contemplating the notion that librarianship, specifically academic librarianship, is dying or ‘in its end game’ to quote outgoing APLA president Su Cleyle”. Ogunsola (2011), too, wonders whether the traditional library is dead. These fears can be partially attributed to the ever dynamic nature of the library and information science (LIS) profession/field (Ocholla and Bothma 2007; Onyancha and Majanja, 2009). The profession (or field) has witnessed numerous changes including name changes of the qualifications and LIS schools as well as changes in the content/curriculum (Zins, 2007) to such an extent that librarianship is not taught in some traditionally LIS schools.

It is well acknowledged that libraries, be they private or public, play important roles in different sectors depending on their nature. Whereas private libraries seek to serve the parent institutions, public libraries tend to cater for a wider audience and a broader scope of the information needs since their clients are diverse in many ways. Traditionally, libraries were considered as the custodians of information resources. However, with the emergence of the Internet and other related technologies, information is not only produced or generated through different media or services but can also be accessed in a fast manner from a variety of sources such as the World Wide Web (hereafter referred to WWW or just the Web), electronic databases, and electronic directories such as Google Scholar, among others. Information resources are also increasingly becoming electronically available. The resources can also be accessed 24/7 from the confines of the user. The user does not need to walk to a physical library to access the information resources housed by the said library. In fact, as early as 1998, Line opined that established functions of libraries (including national libraries) were being threatened by information technology (IT). In his specific analysis of IT and national libraries, Line (1998) observes that:

IT is changing the whole concept of publication; the Web contains, alongside research articles, vast quantities of trivia and also serious discussions of the kind that might previously have taken place in the press. The Web is in fact enabling new forms of communication to prosper. A national library that collected only printed matter would in a few years have a very incomplete record of the nation's published output. Similar factors apply to non-book media, which not all national libraries have collected in the past: if collection is restricted to tangible forms an increasing body of material will be missed.

Libraries are therefore being forced to reconsider the methods they use to serve their clients as well as revisit their collection development policies, among other issues, so as to remain relevant in the ever changing information market. It is more so given that information providers are dealing with technologically literate users whose information seeking behaviours have drastically changed the way libraries operate or should operate. For instance, it has been observed by various authors that library users prefer electronic to print resources (Okello-Obura and Ikoja-Odongo 2010; Joshi and Nikose, n.d.; Kacherki and Thombare 2010). Some libraries, including national libraries, are privy to this information seeking behaviour of their clients and have endeavoured to become more and widely visible to their users through the Internet and more particularly the Web.

It has been argued that the term 'national library' lacks a clear and universal definition (Cornish 1991). In support of such an argument, Cornish (1991: 1) inadequately defines a national library as "a library which calls itself the national library". Instead of belabouring to find a clear definition, different authors have made attempts to outline the characteristics and/or functions of national libraries. Among the key functions or goals of national libraries are to provide remote access to the collection by digitizing relevant materials as well as provide central services such as reference, bibliography and lending to users, both directly and through other library and information services (Poll and Jonsson-Adrial, 2006). In his attempt to describe national libraries, Cornish (1991: 2) says that national libraries are funded mostly from public funds; they are open to the public; and they act as the major archive of printed material produced within the country or region concerned. The IFLA national library section (IFLA 2008) summarizes the responsibilities of national libraries as follows:

collection via legal deposit of the national imprint (both print and electronic) and its cataloguing and preservation; the provision of central services (e.g., reference, bibliography, preservation, lending) to users both directly and through other library and information centres; the preservation and promotion of the national cultural

heritage; acquisition of at least a representative collection of foreign publications; the promotion of national cultural policy; and leadership in national literacy campaigns. National libraries often serve as a national forum for international programmes and projects. They may have a close relationship with national governments, may be concerned with the development of national information policies, and may act as a conduit for the views of other sectors of the profession. Occasionally they also serve the information needs of the legislature directly.

These functions/responsibilities and other library services are increasingly becoming available or performed electronically and more particularly through the Internet and its applications. Although the use of the Internet to access information resources and services can be said to be more prevalent in academic libraries (Onyancha, 2007), national libraries have not been left behind. However, little is known about the extent of the application of ICTs, and more particularly the Internet, in national libraries in Africa. This study is based on the assumption that the libraries' visibility and presence on the Web increases the usage of their services and resources, thereby increasing the libraries' Web impact.

## Purpose of the study

The purpose of this study is to explore the Web presence, visibility, impact and linkage of national libraries in sub-Saharan Africa with a view to:

- Finding out the names or titles given to the NLs;
- Finding out the worldwide as well as regional ranking of the NLs' websites;
- Determining the impact of the NLs' websites;
- Finding out the high impact search queries for each NL's website;
- Determining the top queries driving traffic to each of the NL's websites;
- Determining the search traffic statistics for each NL; and
- Mapping the linkages and co-linkages among and between the NLs.

## Methodology

This study adopted a webometrics approach to investigate the status of national libraries in Sub-Saharan African countries on the Web. Björneborn (as cited in Björneborn and Ingwersen 2004: 1217) defines webometrics as "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”. Webometrics is therefore the application of bibliometric methods to the Web. In essence, webometrics is restricted to the study of patterns of information production, storage, searching, retrieval, dissemination and use on the WWW. In turn, the WWW refers to the portion of the Internet that uses text, images, sound, video and file transportation to provide information in the form of billions of Web pages from around the world. It follows that some aspects of the Internet, such as emails, listservs, forums, usenet news, infranet, intranet, etc, are not covered under webometrics, and categorized instead under cybermetrics which is defined by Björneborn (as cited in Björneborn and Ingwersen 2004: 1217) as “the study of the quantitative aspects of the construction and use of information resources, structures and technologies on the whole Internet drawing on bibliometric and informetric approaches”.

A list of the national libraries in Sub-Saharan Africa (which was the focus geographic region of the current study) was obtained from various online sources which included:

- [www.en.wikipedia.org/wiki/List\\_of\\_national\\_and\\_state\\_libraries](http://www.en.wikipedia.org/wiki/List_of_national_and_state_libraries)
- [www.nationallibraries.org](http://www.nationallibraries.org)
- [www.publiclibraries.com/world.htm](http://www.publiclibraries.com/world.htm)

The lists were consulted to identify national libraries that belonged to countries in Sub-Saharan Africa as listed in Table 1.

Table 1: List of sub-Saharan African countries (Source: Library of Congress [LOC], 2010)

Angola (√)	Côte d'Ivoire (√)	Madagascar (√)	Seychelles (√)
Benin (√)	Djibouti (√)	Malawi (√)	Sierra Leone (√)
Botswana (√)	Equatorial Guinea	Mali (√)	Somalia (√)
Burkina Faso (√)	(√)	Mauritania (√)	South Africa (√)
Burundi (√)	Eritrea (√)	Mauritius (√)	Sudan <sup>1</sup> (√)
Cameroon (√)	Ethiopia (√)	Mozambique (√)	Swaziland (√)
Cape Verde (√)	Gabon (√)	Namibia (√)	Tanzania (√)
Central African Republic	The Gambia	Niger (√)	Togo (√)
Chad (√)	(√)Ghana (√)	Nigeria (√)	Uganda (√)
Comoros (√)	Guinea (√)	Réunion	Western Sahara
Congo (Brazzaville) (√)	Guinea-Bissau (√)	Rwanda (√)Sao Tome	Zambia (√)
Congo (Democratic	Kenya (√)	and Principe (√)	Zimbabwe (√)
Republic) (√)	Lesotho (√)	Senegal (√)	
	Liberia (√)		

A total of 47 institutions presumably performing the responsibilities of national libraries in Sub-Saharan Africa were identified (the countries of affiliation are marked with √). Each of these institutions was investigated to find out whether or not it had a website by *Googling* the name and/or accessing the link provided in the sources mentioned above. Out of the 47 institutions, 32 had web links which implied that the institutions have websites. Each web link was visited to ascertain whether the link was live or not. Given that the main focus of the current study was to explore the status of the national libraries on the Internet and more particularly the Web, it was important to obtain the national libraries that not only had websites but also those libraries with active Universal Resource Locators (URLs). It was found that only 25 links were active/live. Out of the 25 libraries that had live links, 12 were excluded on the basis that their websites were developed in a different language other than English. Also excluded from the 25 libraries with live links were three libraries that were hosted within government departments' websites and which, therefore, did not have their own websites. This process of filtering resulted in a total of ten libraries which were subjected to link analysis in the current study. The libraries are provided in Table 2.

In order to find out the linkages and co-links for each of the above libraries as well as the number of pages and other metrics, Alexa ([www.alexa.com](http://www.alexa.com)) search tool was used. This website provides site ranking, in-links and volume of traffic. It also provides traffic rank which shows how popular the site is compared to

others; search analytics which show terms that competitors use to get traffic; and audience data which shows what kind of visitors the site attracts. Alexa is the leading provider of free, global Web metrics. One can search Alexa to discover the most successful sites on the Web by keyword, category, or country. Of particular interest is the use of the analytics for competitive analysis, benchmarking, market research, or business development (Alexa Internet, 2010). This tool has been used by several researchers (e.g. Baker, 2011; Hanson, 2000; Lin, Huang, Chen & Lin, 2004) to conduct similar studies as the current one. Underscoring the applicability of Alexa in assessing websites, Baker (2011: 136), for instance, observes that “Alexa is able to determine web site usage, which is an indicator of online quality by showing the number of in-links and web traffic volume of the web sites”. The data collection exercise was conducted in April 2012.

Table 2: List of National Libraries (NLs) investigated in this study

NAME OF LIBRARY	LIBRARY URL
National Library Service of Botswana (NLBW)	<a href="http://www.mysc.gov.bw/nls/">http://www.mysc.gov.bw/nls/</a>
National Archives and Library of Ethiopia (NALE)	<a href="http://www.nale.gov.et/national_library.html">http://www.nale.gov.et/national_library.html</a>
George Padmore Research Library (division of Ghana Library Board) (GLB)	<a href="http://www.ghanalibraryboard.com/">http://www.ghanalibraryboard.com/</a>
Kenya National Library Service (KNLS)	<a href="http://www.knls.ac.ke/">http://www.knls.ac.ke/</a>
National Library Service of Malawi (NLSMW)	<a href="http://www.nlsmw.org/">www.nlsmw.org/</a>
National Library of Mauritius (NLMU)	<a href="http://national-library.gov.mu/">http://national-library.gov.mu/</a>
National Library of Nigeria (NLA-NG)	<a href="http://www.nla-ng.org/aboutus.html">http://www.nla-ng.org/aboutus.html</a>
National Library of South Africa (NLSA)	<a href="http://www.nlsa.ac.za/">www.nlsa.ac.za/</a>
National Central Library / Tanzania Library Services Board (TLSB)	<a href="http://www.tlsb.or.tz/">http://www.tlsb.or.tz/</a>
National Library of Uganda (NLU)	<a href="http://www.nlu.go.ug/">www.nlu.go.ug/</a>

## Results and discussion

This section presents and discusses the findings under the following subheadings which were drawn according to the objectives of the study, namely; names or titles given to the NLs; site rankings; impact of the NLs' websites; high impact search queries for the NLs' websites; top queries driving traffic to each of the NL's websites; search traffic statistics for each NL; and social network maps of the NLs' in-linking sites.

## Titles of libraries

Out of forty nine countries in sub-Saharan Africa, forty seven are listed in the sources of data as having a national library. Some of these libraries are labelled as:

- Research or documentation centres, e.g. Research and Documentation Center of Eritrea; George Padmore Research Library (division of Ghana Library Board); National Institute for Studies and Research);
- National archives, e.g. National Archives and Library of Ethiopia; the National Archives of Niger; and National Archives of Zimbabwe Library; library of the National Assembly;
- Library Service, e.g. Swaziland National Library Service; Tanzania Library Services Board; Zambia Library Service; National Library Service of Botswana; National Library Service of Kenya; Lesotho National Library Services; and National Library Service of Malawi;
- Library Board, e.g. Tanzania Library Services Board; Ghana Library Board; and Sierra Leone Library Board

The term ‘national library’ is the most commonly used to give labels to the libraries. This pattern of naming the national libraries can be attributed to the fact that the exact meaning of the concept of the national library is not clear. In addition, a library does not have to be a ‘national library’ or have the term National in its nomenclature to perform national library functions.

## Site rankings

As pointed to above a total of 10 websites were subjected to analysis via Alexa. The results are shown in Table 3. It was found that the NLA-NG was ranked the top among the 10 national libraries. The library was ranked at position 1,704,690 followed by the NLSA, KNLS, GLB, NLU, and TLSB. Whereas four libraries were ranked among the top 10 million websites in the world, the others were ranked among the top 10 to 15 million. It was also found that a total of three libraries’ ranking data was not available, implying that Alexa could not obtain sufficient data to rank the websites. In terms of the ranking of the libraries within the country in which they are situated, only the NLA-NG obtained a rank of 5,371. This means that the national library in Nigeria was ranked at position 5,371 in the country. The rest of the libraries’ websites did not get ranked because Alexa could not obtain sufficient data for such a ranking to take place.



Table 3: NLS' global ranking and in-links

Site	Rank	Rank in Country
National Library of Nigeria (NLA-NG)	1,704,690	5,371
National Library of South Africa (NLSA)	1,899,794	No data
Kenya National Library Service (KNLS)	7,350,073	No data
George Padmore Research Library (division of Ghana Library Board) (GLB)	9,321,783	No data
National Library of Uganda (NLU)	10,022,296	No data
National Archives and Library of Ethiopia (NALE)	10,394,814	No data
National Central Library / Tanzania Library Services Board (TLSB)	14,509,434	No data
National Library Service of Malawi (NLSMW)	No data	No data
National Library of Mauritius (NLMU)	No data	No data

In view of the above, the study sought to find out the sites that are top ranked in each of the countries covered in this study at the national and international levels. The purpose of such an analysis was to find out whether or not libraries feature anywhere in the top ranked sites. Table 4 provides the top ranked national sites in each country. In almost all the countries in which the above 10 libraries are located, the news media (radio, magazines or newspapers) was the dominant and therefore highly valued by the Internet users. For instance, the news media websites topped the list of the highest ranked sites in Ethiopia, Kenya, Malawi, Nigeria, South Africa, and Uganda. Another category of sites that were visited the most by Web users dealt with banking, tourism, accommodation, cellphone service providers, jobs and careers, online shopping, airlines/airways, government offices, business, and Internet service providers. The Wikipedia (specific to the countries) as well as the search engine (Google) were also frequently visited.

Table 4: National top sites (all categories) per country

	<b>Botswana</b>	<b>Ethiopia</b>	<b>Ghana</b>	<b>Kenya</b>	<b>Malawi</b>	<b>Mauritius</b>
1	Govt of Botswana	Ethiopian Reporter	Ghana Web	Daily Nation	Nyasa Times	Google Mauritius
2	Mmegi Online	nazret.com	ModernGhana.com	The Standard	Wikipedia	Orange
3	Botswana Gazette	Ethiopian Airlines	Web Hosting, Domain name services	Mocality	Scotland-Malawi Partnership	Government of Mauritius
4	Botswana country inf	Cyber Ethiopia	BusinessGhana	Capital FM 98.4	Globe Internet Ltd	Wikipedia
5	Wikipedia	Tigrai Online	Citifmonline	Business Daily	The Maravi Post	Air Mauritius
6	AutoGuide	Walta Info Center	Ghanasoccernet.com	Kenya Airways	Malawiana	Mauritius Turf Club
7	Air Botswana	Ethiopian News Ag.	Daily Guide Newspaper	Bidorbuy Kenya	Malawi SDNP	Mauritius Meteo Service
8	Botswana Tourism Board	Wikipedia	Vodafone Ghana	Propertyleo.com	Capital Radio	Island Crisis
9	Go 2 Africa	GondarLink Guide to Ethiopia	Ghanamma.com	Kenyaplex	Cichlid Fishes of Lake MW	Islandinfo
10	Tule Safari Lodge	Ben's News Page	Vide Ghana	AccessKenya	Raising Malawi	Constance Hotels
11	Bank of Botswana	Ministry of Foreign Affairs	Ghana Broadcasting Corp	Mashada Discussions	Wikipedia - Hastings Banda	Mauritius Telecom Group
12	Chobe Safari Lodge	United States	Ghana Net	Wasua	MW: The Warm Heart of Africa	The Residence Mauritius
13	Telecoms Corp	Habesha	The Republic of Ghana	KRUSS Real Estate	MalawiNet	Mauritius Budget Hotels
14	Audi Camp	Selamta	Wikipedia Ghana	KE Domain	Wawa MW Travel Guide	Isla-Mauricia
15	Wild Botswana	allAfrica.com	Ghana News Agency	Best Jobs Kenya	tnm	Beachcomber Hotels

As regards the international sites that are highly ranked in individual countries, Alexa provided data for six out of ten countries investigated in this study. The top 10 international sites according to the countries are as follows:

- Ghana: Facebook, Google, Yahoo, YouTube, Twitter, Wikipedia, Windows Live, Blogspot.com, BBC Online, and LinkedIn;
- Kenya: Google, Facebook, Yahoo, YouTube, Twitter, Blogspot.com, Wikipedia, LinkedIn, BBC Online, and WordPress.com;
- Mauritius: Facebook, YouTube, Google, Yahoo, Wikipedia, Windows Live, Blogspot, Defimedia.info, eBay, and MSN;

- Nigeria: Facebook, Google, Yahoo, YouTube, Blogspot, Wikipedia, LinkedIn, 302 Found, Blogger.com, and Amazon.com;
- South Africa: Google, Facebook, YouTube, Yahoo, Wikipedia, LinkedIn, Twitter, Blogspot, Windows Live, and Amazon.com; and
- Uganda: Facebook, Google, Yahoo, YouTube, Twitter, Wikipedia, Blogspot, LinkedIn, Windows Live and Go.com.

Apparently, the social network sites, search engines and Wikis (i.e. Wikipedia) are the most commonly used by Web users in not only the countries listed above but also (we can safely conclude) in all African countries. This pattern is evident when the global trend is examined. According to Alexa's three-month traffic, the following sites are the highly ranked in the order given: Google, Facebook, YouTube, Yahoo, Baidu.com, Wikipedia, Windows Live, Twitter, QQ.com, Amazon.com, Blogspot, LinkedIn, Google India, Taobao.com, and Yahoo Japan.

### Web impact of the NLS

At its most basic, the Web impact of any given web site is measured by counting the number of other sites, indexed in the same search engine, which have links to the site as well as computing the number of in-links per page (Thelwall, 2000a; Onyancha, 2007). In-links are synonymous to citations, which measure the citation impact of a publication. The in-links are supposed to reflect the acknowledgments received by an external web document.

Table 5: Impact of the NLS' websites

Site	Pages	In-Links	Links/page
National Library of Nigeria (NLA-NG)	61	15	0.25
National Library of South Africa (NLSA)	120	316	2.63
Kenya National Library Service (KNLS)	51	25	0.49
George Padmore Research Library (division of Ghana Library Board) (GLB)	10	8	0.80
National Library of Uganda (NLU)	18	62	3.44
National Archives and Library of Ethiopia (NALE)	49	77	1.57
National Central Library / Tanzania Library Services Board (TLSB)	104	16	0.15
National Library Service of Malawi (NLSMW)	2	25	12.50
National Library of Mauritius (NLMU)	1	6	6.00

Table 5 shows that the NLSA received the highest number of in-links (i.e. 316) followed by NALE, NLU, KNLS and NLSMW. In terms of the number of pages per site, the NLSA recorded the highest number (120) followed by TLSB which yielded 104 pages. The average number of in-links per page was as follows, in the order of the highest to the lowest: NLSMW (12.50), NLMU (6), NLU (3.44), NLSA (2.63) and NALE (1.57), just to name the top five.

### High and medium impact search queries for each library's website

The Web-based directory used to extract data for this study provides Impact Factors (IFs) and popularity values for queries for a particular site. The High Impact Search Queries for site refers to:

a list of search phrases and sub-phrases that drive organic traffic to a website, sorted by their Impact Factor. The Impact Factor takes into account how much traffic a phrase drives to the site, how popular the phrase is (Query Popularity), and how much competition there is for that phrase (QCI). This can give you a quick look into which terms are important for a site's organic search, especially those with a high popularity but low QCI (Alexa Internet 2010).

The search analytics provided by Alexa indicated that some search queries produced high impact factors while others registered medium or low impact factors. The following exposition provides search queries that recorded medium or high impact in terms of the IF as well as their popularity index (provided in brackets in that order):

- **NLA-NG**
  - High: online forum [61.83, 20], library website [24.51]; and
  - Medium: registration [3.89, 39], Nigeria [3.65, 57], library [2.37, 47], president of [2.33, 12];
- **NLSA**
  - High: South Africa [9.79, 45], Cape Town [8.45, 41], WebAccess [6.70, 27], Cheap hosts [6.02, 19]; and
  - Medium: small scale book publishing [4.78, 7], cheap hosts finder ssl [4.74, 12], venue rental rates in Pretoria [4.48, 7]);
- **KNLS**
  - High: nakuru [29.36, 20], national library [20.45, 25], Kenya literature bureau [10.06, 9], libraries [7.44, 28], national [6.35, 43]; and

- Medium: schemes of work [5.03, 9], collection [4.21, 39], and webmail [2.55, 62];
- **NLU**
  - High: book fair [43.81, 26], money expenditure [13.68, 41], digital library [11.02, 32], world digital library [10.05, 14], fair 2011 [9.89, 3], national library [9.34, 25];
- **NALE:**
  - High: Ethiopian [60.88%, 31], proclamations [32.46, 13];
- **TLSB**
  - High: library (85.47, 47], Tanzania [6.53, 43]; Medium: finnish [3.78], tsh [3.78];
- **NLSMW**
  - High: get my ex back [49.78, 23], dating [39.22, 49];

The other libraries produced low impact values or none at all.

### Top driving traffic to each NL site from search engines

The top queries (with their percentages of traffic) that drive traffic to each of the national library websites from search engines were as follows:

- **NLA-NG:** nla online forum (33.83%), Nigeria library website (23.29%), Nigeria library registration council (16.29%), president of the Nigerian library registration council (16.08%), ircn (5.55%)
- **NLSA:** 1659 special edition wine (7.16%), luc (5.48%), novell webaccess (5.17%), isbn South Africa (4.76%), 1919 block ux mabopane 0190 (3.27%), Cape Town libraries (3.20%), webmail carantegroep (3.04%), dessinian collection (2.54%).
- **KNLS:** [www.knls.ac.ke](http://www.knls.ac.ke) (48.34%), knls nakuru (13.96%), physics schemes of work by Kenya literature Bureau (8.12%), Kenya national library (7.60%), Kenya national libraries (7.59%), knls ac ke webmail (5.19%).
- **GLB:** gla Ghana (100%)
- **NLU:** Kampala book fair 2011 (23.72%), national library of Uganda (16.30%), Uganda (14.14%), Kampala book fair (13.69%), ‘much more stored’ (7.92%), ip:72.29.74.59 pay (6.58%), world digital library (6.03%).
- **NALE:** Ethiopian proclamations (80.78%), [www.nale.gov.et](http://www.nale.gov.et) (5.10%),
- **TLSB:** Dr. Alli Mcharazo (43.83%), abbas kandoro (15.03%), library receive (9.92%), bodi ya huduma za maktaba Tanzania (9.51%), library recev (8.78%), and Finnish library association (3.64%)

- **NLMW:** Dating demystified (75.39%), get my ex back (24.61%).

The other library websites (i.e. NLMU and NAZLSMW) did not yield any data. Although these search queries are said to be driving traffic to the library websites, there are some search queries that do not actually inquire on any library-related issue. These include ‘1659 special edition wine’, ‘1919 block ux mabopane 0190’, ‘Dating demystified’ and ‘get my ex back’. How and why these search queries direct traffic to the library websites was not clear from the data obtained from Alexa. However, it was noted that most of the search queries are subject (i.e. library)-related. It is worth noting that some of the queries could have been posed by the same people.

### Traffic statistics

The estimated percentage of global internet users who visit each of the websites is provided in column 2 of Table 6. The table shows (see column on *reach*) that the largest percentage of users visited NLA-NG followed by NLSA, KNLS, NLU, GLB, NALE and TLSB, in that order. In terms of the estimated percentage of global pageviews on websites, the NLSA and NLA-NG were leading with an equal amount of pageviews. Ranked second in that respect was GLB followed by TSLB, KNLS, NLU and NALE. The pageviews/user refers to the estimated daily unique pageviews per user for each website and was highest in TLSB (i.e. 9) followed by GLB (8), NLSA (2.7), NLA-NG (2.7), KNLS (1.5), and NLU and NALE which produced a value of 1.

Table 6: Traffic statistics for selected NLS in sub-Saharan Africa

Library	reach	pageviews	pageviews/user	bounce%	time on site	search %
nlsa	0.00007	0.000002	2.7	31.8	8:06	22.7
nla-ng	0.00008	0.000002	2.7	-	4:01	-
knls	0.000014	0.0000002	1.5	-	-	-
glb	0.000006	0.0000005	8	-	-	-
nlu	0.00001	0.00000001	1	-	-	-
nale	0.000005	0.00000004	1	-	-	1
tlsb	0.000003	0.0000003	9	-	3:15	-
nlsmw	-	-	-	-	-	-
nlmu	-	-	-	-	-	-

### Social network of in-links

Social network maps are often used to visually represent relationships among different entities, which can be people, institutions, words, or countries, among others (Onyancha 2008; Wikipedia 2012; Scott in Phillips and Phillips 1998). Wikipedia (2012) defines social networks as structures consisting of nodes that are linked to each other by one or more specific types of relations. The relationships between the actors would usually take the form of any of the following: values, visions, ideas, financial exchange, friendships, kinship, conflict, trade, web links, sexual relations, disease transmission, or airline routes, etc. Web links have been examined to map the relationships that exist between web sites (see Onyancha and Ocholla 2007; Thelwall 2002a, 2002b, 2002c, 2003, 2004).

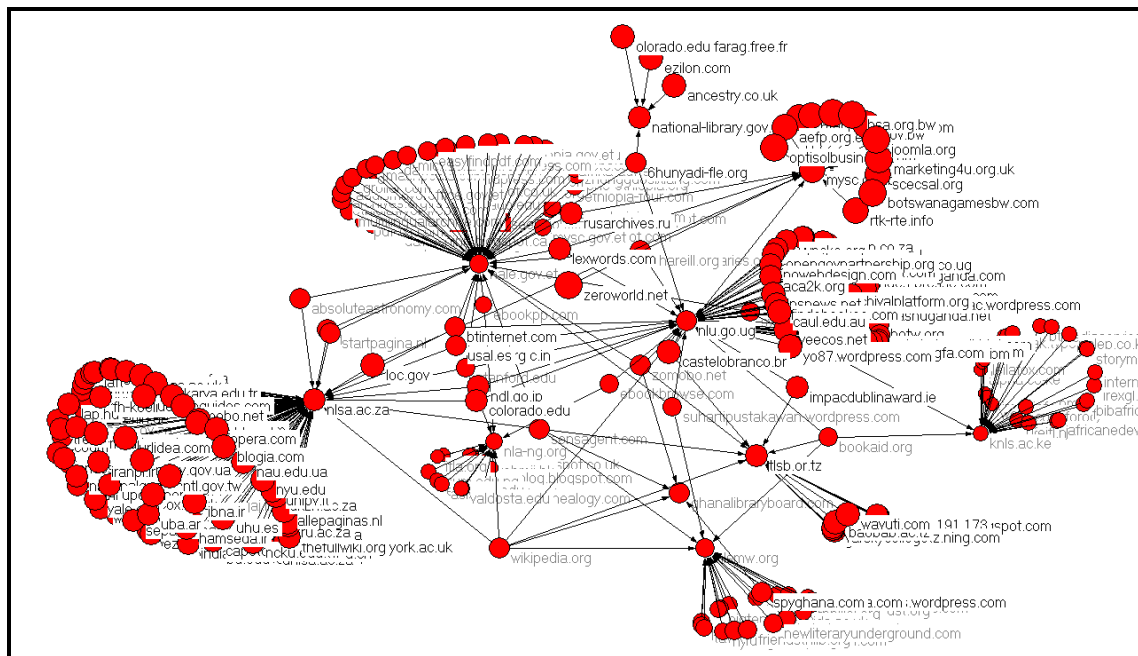


Figure 1a: Social network map of in-links to NLs in sub-Saharan Africa (with labels).

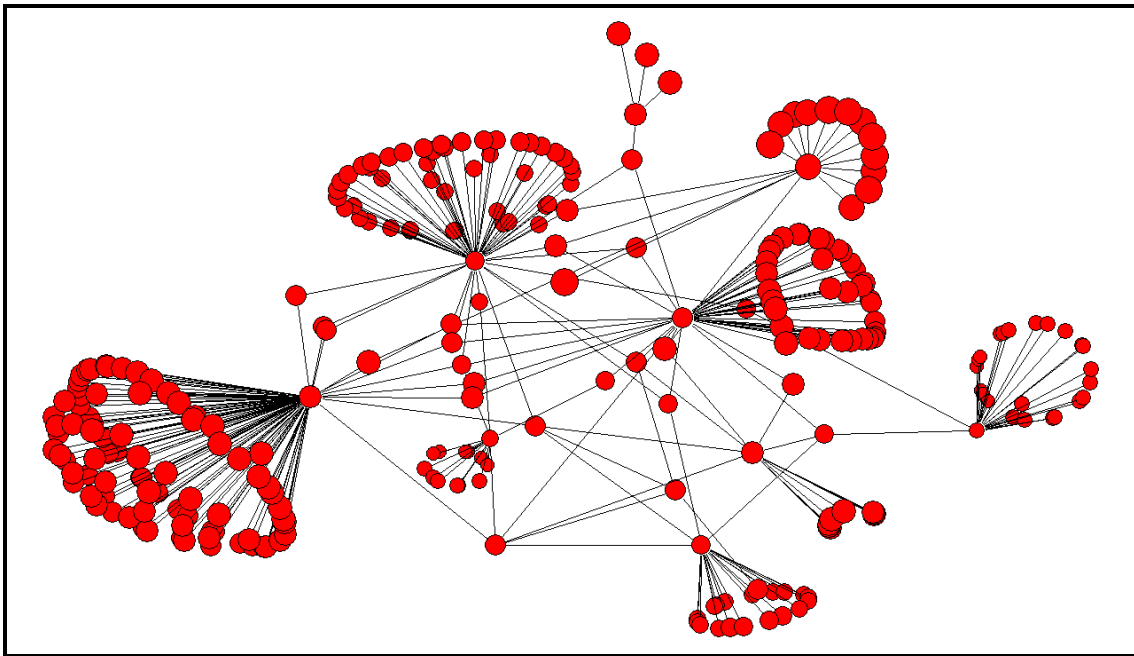


Fig 1b: Social network map of in-links to NLs in sub-Saharan Africa (graph only).

Figures 1a and 1b provide the social network maps for the ten NLs selected for this study. The Figures reveal clusters as well as links and co-links among the libraries and the sites linking to the libraries. The thickest cluster consisting of the top 100 sites (bottom left corner) belongs to the NLSA. There were a total of 316 sites linking to the site [www.nlsa.ac.za](http://www.nlsa.ac.za) but for purposes of visualizing the network, 100 high impact sites were selected. Among these are wikipedia.org, ask.com, ancestry.com, dmoz.org, theplanet.com, opera.com, and nationalgeographic.com. An analysis of the linking sites revealed that the links originated from companies, governments, educational institutions and blogs. This pattern was similar for the rest of the nine libraries. Of particular interest was the co-linking of some of the libraries by a few sites. These co-links are illustrated by the lines joining external sites to two or more library sites in Figures 1 and 2. The site with the highest number of links to the libraries was Wikipedia.org which produced links to six libraries, thereby co-linking the libraries. Co-linking is analogous to co-citing, which is based on the assumption that if two references are cited together, in any later literature, the two references are themselves related in some way (Onyancha and Ocholla 2008; Ungern-Sternberg 1995; Ikpaahindi 1985; Wallace 1989). Besides Wikipedia which had links to six NLs (i.e. NLSA, GLB, NLSMW, NLA-NG, TLSB, and NLU), there were 33 other sites that linked at least two libraries. These sites include: sensagent.com (5), bookaid.org (4), stanford.edu (4), zomobo.net (4),



dmoz.org (3), suhartipustakawan.wordpress.com (3), wdl.org (3), sylviamilne.co.uk (3), lexadin.nl (3), lexwords.com (3), btinternet.com (3), castelobranco.br (3), and unipune.ac.in (3), just to name the sites with at links to at least three NLs each.

Wikipedia.org, which is ranked number six worldwide according to the three-month Alexa traffic ranking, is a free online encyclopedia built collaboratively using wiki software. Sensagent.com is also highly ranked not only in the world but also in France. Worldwide, the site is ranked number 4785 in Alexa's three-month traffic ranking while it is ranked number 475 in France. Seemingly the sites that link to the NLs' websites are highly ranked in the world and majority of them deal with general matters. For instance, sensagent.com is an online dictionary that also offers translations of words. Bookaid.org provides books to libraries, hospitals, refugee camps and schools in order to support literacy, education, training and publishing in over 40 countries around the world. The organization concentrates over 85% of its resources on 13 countries in sub-Saharan Africa. The site has a three-month global Alexa traffic rank of 2,388,466. It has been online for more than 14 years. The site can be found in the "Open Access" category. Zomobo.net is a search tool (and not a search engine, according to the information found on the site's Web page: <http://zomobo.net/about.php>) that provides content only for specific topics such as concepts, subjects, personalities, events, places, companies, products, etc., but not for broader, unspecific searches. Zomobo.net is ranked number 10,868 in the world according to the three-month Alexa traffic rankings. Dmoz.org (Open Directory Project) is a searchable people-reviewed Web directory categorized by language, subject and location. It is edited and run by volunteers in 80 languages. Dmoz.org is ranked number 711 in the world according to the three-month Alexa traffic rankings.

## Conclusions and recommendations

The InternetworldStats.com website (Internet World Stats 2012) reports that Africa has continued to witness the highest growth rate in terms of the number of internet users as well as the internet penetration. That notwithstanding, given the results of this study, it is evident that the NLs have not taken advantage of the ICT developments in Africa to develop their Internet infrastructure including the construction of their own web sites. Only 25 of the NLs are said to have their own web sites, although some of these web sites are not accessible due to dead links from the sites that have listed them. *Googling* the names of the libraries as provided in the sources that were used to obtain the list of libraries,

too, yielded no results as the URLs could not be found. The factors leading to the non-development of national libraries' own web sites needs to be investigated so that the libraries could have wide visibility and of course functionality, on the Internet. However, one of the factors that may be said to be contributing to the situation is funding. Line (1988) observes that government funding for NLs has tended to decline over time.

In terms of their names, the institutions offering the functions of national libraries in sub-Saharan Africa are known by various names including national library, national archives, library service, service board, research institutes, etc. Despite the national libraries performing other functions, would it not be advisable to call the 'institutions' by their rightful name, i.e. national library? In this way, their identity is not lost. It is evident however, that libraries may soon change their names to reflect the trends in the information and knowledge environment. For instance, Pantry and Griffiths (2003: 102) indicate that "there has been a trend in recent years for libraries to change their names to be called information or knowledge centers" and "librarians have begun to be called by other names such as knowledge managers". Most probably, NLs will also change their names to be called such names as 'national information repositories' or 'national knowledge repositories'.

The low ranking of the NLs' websites (in terms of the number of pages, page views and impact) revealed similar results as those of other NLs in other developing countries outside Africa. The exception was such libraries as the Trinidad and Tobago National Library which was ranked in position 872274 worldwide within the same period while the National Library, Singapore was ranked number 150934. The rest of the highly ranked NLs were those located in developed countries. For example, the Library of Congress, perhaps the largest NL in the world, was ranked in position 3402 worldwide and number 1085 in the USA while the National Library of Scotland is in position 249713 in the world, just to mention a few. The low ranking of even the largest NL in the world leads us to ask: are libraries marginalized on the Web? This seems to be true just as libraries are also marginalized as physical entities (Learner, 2009). Borah (2005), too, alludes to the marginalization of libraries and attributes this to the emergence of the Google generation.

With the exception of the NLSA which posted a total of 316 in-links, the NLs in Sub-Saharan Anglophone countries have received links from less than 100 sites. This pattern is in tandem with the findings of Onyancha and Ocholla's (2007) study on the performance of South African and Kenyan universities on the WWW. The academic libraries in eastern and southern Africa (Onyancha 2007)

produced similar results. Seemingly therefore African institutions do not receive as many links from other institutions in the world as their counterparts in developed countries. For instance, the Library of Congress and the National Library of Scotland received links from a total of 93345 and 2625 sites, respectively. It was, however, not possible to determine whether or not the out-links from the NLs in sub-Saharan Africa are among the in-links to the NLs in developed countries. But it is assumed that just like authors in developing countries prefer to publish in journals published in foreign countries while receiving few citations from the foreign countries, libraries in sub-Saharan Africa may prefer to have links to libraries located outside the region. This pattern may be attributed to the low web impact for each of the NLs investigated in this study as shown in Table 5.

With regard to the high and medium impact search queries for each library's website as well as the top search queries that drive traffic to the libraries' websites from the search engines, it was noted that majority of the search queries are subject/issue-oriented. Most of the queries addressed library-related issues. However, there are some of the issues that were not at all related to libraries but which still drove traffic to the libraries' sites. This traffic can be improved if the libraries' web sites contained as many keywords as possible. This can be done by populating the websites with relevant web documents which, at the same time, deal with diverse issues. It should be remembered that most search engines use keywords to retrieve the user's desired results.

The traffic statistics, too, revealed a relatively poor performance of the Sub-Saharan African NLs on the Internet in terms of the reach, pageviews, bounce, time on the sites and searches emanating from search engines computed as a ratio of the world total. It was noted that some of the libraries did not yield sufficient data for comparison purpose. However, when we compared the performance of the libraries in Table 6 with high ranked libraries such as the Library of Congress (LOC) and the National Library of Scotland, we noted that some of the libraries (e.g. NLSA) compared favorably with the two libraries in some aspects. For instance, the LOC produced the following results in the order of *reach, pageviews, pageviews/user, bounce %, time on site and search %* over three-months in Alexa: 0.0365, 0.002064, 5.99, 49.9, 04:15, 12.3. Again it is evident that there is need to improve the libraries' web sites by developing them to compete at the international level.

Finally, the mapping of the in-links in Figures 1 and 2 revealed small clusters which were caused by the fact that the NLs received very few in-links from other sites on the Web. Most of the NLs were, however, co-linked by two or

more sites with the biggest linking site being the Wikipedia which has a list of the national libraries of the world. Given that the highly ranked sites are search engines, social network sites, and Wikis, and in order to prosper, it is recommended that the libraries should embrace the ICTs to become more visible through the Internet and more particularly the aforementioned sites. For example, the libraries should have their own pages on such social network sites as Facebook, Twitter, LinkedIn, MySpace, and Google Plus+. The use of these sites, among others, will ensure wider visibility in the Internet. It should be emphasized that most of these sites are widely available through such ICTs such as mobile phones, iPads, and Notebooks which are easily carried around and therefore constantly in use.

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## Endnote

<sup>1</sup> A new country was born in 2011 – South Sudan